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PENNSYLVANIA'S OIL INDUSTRY

By ERNEST C. MILLER

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PENNSYLVANIA'S OIL INDUSTRY

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WARREN, PENNSYLVANIA

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THE EARLIER DAYS

Imagine, if you can, what your life would be like if petroleum and all its derivatives were taken away from you. The retrogression of all society would begin immediately and continue for a long time, for it is doubtful whether any material has found a wider variety of important uses than have petroleum and its multitudinous products.

In an economic sense, petroleum and the gigantic industry that has grown up to develop this raw material are less than a century old.

It should be understood that the knowledge of petroleum is very old. The ancient Egyptians used it for lubrication, waterproofing, painting, and mummification, and the Bible mentions it frequently in various forms. Natural gas from oil seepages was sent through bamboo pipes and burned for heat by the Chinese long before the Christian era.

Juan Rodriguez Cabrillo, the Portuguese sailor in the service of Spain, brought two vessels to a pitch deposit in 1542-43 where Carpenteria, California, is located today. With this pitch his ships were recaulked and made seaworthy again.

Petroleum was first found in commercial quantity in northwestern Pennsylvania, and many of the methods and skills of the industry were developed by the early drillers, transporters, refiners, and marketers in that part of the state. The petroleum industry deserves a careful examination but let us first take a look at the earlier days.

Within the present boundaries of Pennsylvania, early white settlers were astounded to find remnants of oil pits strewn along Oil Creek between what are now Titusville and Oil City, a distance of seventeen miles. Pits were found also along other streams farther to the north, some as far as in the present Warren County area. These pits were about eight feet long, six feet wide, and six to ten feet deep, varying in shape from square to rectangular to oval and round. Timber had been set vertically around the banks of the holes to prevent the earth from caving.

William H. Davis of Meadville wrote in detail about these pits which he personally inspected in 1848. Piles of dirt from the excavations were visible alongside many of the pits. Growing from these heaps and sometimes from the rims and centers of the pits were large trees, which were estimated to be two hundred to three hundred years old. The trees that were three centuries old would date the pits earlier than the year 1548.

Neither the rather complete military records of the French, who were early visitors to this section, nor Indian history and tradition mention the works. The exact uses of all the oil available from these pits is still unknown. It is thought that the pits were probably constructed by the Mound Builders who spent some time in the trans-Allegheny region. Whoever constructed the pits probably allowed water to seep into them so that the crude petroleum floated to the surface and could be skimmed off with broad flat paddles.

The Pennsylvania oil springs were known to Peter Kalm, the famed Swedish naturalist, and also to François Pouchot, the last French commander of Fort Niagara, who heard of the springs in the 1750's and described them in his memoirs.

It remained for David Zeisberger, the intrepid Moravian missionary to the Indians, to report on them more extensively. His diary for October 7, 1768, relates that some of his company had been hunting while they were camping in the vicinity of the present village of Tionesta. He wrote:

> They brought back some oil from the oil-well. There are said to be various such wells in this region. The oil has a very strong odor, and cannot be used with foods. The Indians use it externally as a medicine and it would be possible to use it for lighting. The oil comes out of the ground with the water and then rises to the top so that it is possible to skim it. The Indians generally try to get that which has just come up, as it has not so pungent an odor. The nature of these oil-wells might well be investigated.

Surely Zeisberger was a man well ahead of his time.

The first white settlers used petroleum and called it "Seneca oil" after the tribe which controlled the region.

Lewis Evans' "Map of the Middle British Colonies in America," which appeared in 1755, was the first published map to show petroleum in Pennsylvania, near the site of Oil City and Titusville. Reading Howell's "Map of Pennsylvania" in 1791 shows a stream which flows into the Allegheny River as "Oyl Creek," our present Oil Creek, named for the petroleum floating on its surface.

Among the earliest residents along Oil Creek, Nathaniel Carey was an entrepreneur of the first order: not only did he gather petroleum and peddle it in his vicinity, but he traveled as far as Pittsburgh with his oil. His sturdy horse carried two five-gallon kegs, and Carey traded the petroleum for family necessities to Pittsburgh merchants who in turn sold it to druggists and doctors.

Although the demand for oil as a home cure-all was quite limited, other uses were soon developed for it. Mixed with flour it was an excellent axle grease and a serviceable lubricant on any farm. Sawmills employed it in its natural state as a journal lubricant, and the very poor burned it for light even though it had an odor and gave up black smoke.

The Search for Light

For at least twenty years prior to the Civil War, the search for better and cheaper sources of light was extensive. Tallow candles and whale oil were the best illuminants but both were expensive and a family could be sure that such materials would cost them more year after year.

The extensive increase of transportation facilities, chiefly railroads and steamships, plus the heavy industrial mechanization, placed an additional drain on both lubricants and illuminants and tended to boost prices still higher. In 1850 the demand for whale oil was over 15,750,000 gallons, and the price ranged from 75c to $1.00 a gallon with whales getting more scarce yearly. The demand for lard oil and tallow was 9,450,000 gallons for each article per year. Less expensive substitutes for lighting were widely used, camphene the most extensively, but this was a highly dangerous product being purified oil of turpentine distilled over quicklime to free it from resin and then mixed with alcohol to "stretch" the supply and improve the burning quality.

To a Canadian geologist, Dr. Abraham Gesner, goes the credit for making the first successful illuminating oil in North America. It was produced from a bituminous mineral found in Albert County, New Brunswick. In 1846, during lectures on Prince Edward Island and later at Halifax, samples of the burning fluid were exhibited, and Gesner called it "keroselain," the word being derived from the

Greek forms meaning "wax" and "oil." The name was soon shortened to "kerosene" and from that time on, most burning oils were commonly called "kerosene"—a name in good usage today.

Under Gesner's supervision, a large processing plant was erected by the New York Kerosene Oil Company. To this concern he had sold his patents, and by 1854 the plant was manufacturing kerosene from cannel coals.

Two Boston brothers and chemists, Luther and William Atwood, had also been experimenting and in 1852 made coal oil from coal tars, the first produced for sale in the United States. The Atwood discovery was named "coup oil" because of the *coup d'état* by Louis Napoleon a few months earlier. This oil, a blend of castor oil with animal fats, had a trenchant odor. The brothers established the United States Chemical Manufacturing Company at Waltham, Massachusetts, and hired chemist Joshua Merrill to assist them in marketing their oil.

A Boston sperm-oil candlemaker, Samuel Downer, soon purchased the Atwood plant and persuaded the Atwoods and Merrill to work with him. Their combined efforts led to the production of a fine heavy lubricating oil. However, they could not remove the odor from it and the business declined to a dangerous point.

A trip to Glasgow, Scotland, by Merrill and Luther Atwood was made in 1855 for the purpose of building a plant and instructing the employees of George Miller and Company, of that place, how to operate it on the coup-oil process. The firm had persuaded Downer to lease his process on a royalty basis, and Atwood, while working at this new plant, cracked some naphtha into a light oil that burned with great brilliance and without odor.

Upon their return, in October, 1856, Merrill and Atwood decided that their future lay in the production of a good illuminant rather than in lubricating oils. Downer was hard to convince, but he finally erected a plant at Boston and another at Portland, Maine. Merrill developed a battery of special retorts in which twelve hundred pounds of coal yielded 360 gallons of crude oil per day; soon fifty such retorts were yielding 650,000 gallons of refined oil yearly. New Brunswick coal or "Albertite" was the raw material chiefly used by the Downer Kerosene Oil Company.

Within three years, more than thirty-five plants were engaged in producing coal oil, with the Lucesco plant in Westmoreland County, Pennsylvania, reaching the highest daily output of six thousand gallons, and the total output of the combined plants exceeding 20,000 gallons daily. All of these plants used cannel coals, and the finished product was so much cheaper and better than previous illuminants that the making of coal-oil lamps and lamp wicks developed into a large business.

Salt and Oil

While these chemists were perfecting a good illuminating fluid from coal-oil, in quite a different section of the United States petroleum was being placed on the market, first as a medicine and a little later as an illuminant.

The first clear record of the use of petroleum as a commercial lubricant dates from 1845 when a salt-well owner from Tarentum, Pennsylvania, Lewis Peterson, Sr., delivered a sample of oil from one of his wells to the Hope Cotton Factory at Pittsburgh. The mill owners found that petroleum blended well with sperm oil; together these two liquids produced a superior lubricant for cotton spindles and at the same time made possible a saving of fifty per cent. J. H. A. Bone, an oil writer of 1865, reported:

> The saving was so great that a contract was entered with Mr. Peterson by which the latter was to supply two barrels per week, and for ten years this oil continued to be used at the Hope Cotton Factory, unknown to anyone but the proprietors.

Salt producers had long been accustomed to the interference caused by petroleum in their salt-well operations along the Monongahela and Allegheny Rivers. Often the supply of oil exceeded that of the salt brine. Some of their salt wells threw oil so high into the air that they actually were gusher wells.

Samuel M. Kier

At Tarentum, twenty miles north of Pittsburgh on the Allegheny River, salt wells owned by Samuel M. Kier and his father produced quantities of petroleum. Knowing of no use for the oil, the well owners ran it onto the ground and quite often into the Pennsylvania Canal, much to the disgust of canalboat owners who cried that the greasy stuff ruined their hemp cables and dirtied their newly painted boats.

When the wife of Samuel Kier became ill, the doctor prescribed the use of "American Medicinal Oil," a material originating from a well near Burkesville, Kentucky. Kier, a smart and active businessman who owned refractories, coal mines, and an iron foundry, and one of the initiators of a transportation company moving canalboats between Pittsburgh and Philadelphia, thought that the oil from his salt wells was the same as the "American Oil" being used by his wife. He was so sure of this that he lost no time in bottling his oil and marketing it as "Kier's Petroleum or Rock Oil," eight ounces for fifty cents. If it accomplished anything Kier claimed for it, it was indeed cheap, for it was promoted as a cure for burns, ulcers, cholera, asthma, indigestion, rheumatism, and blindness.

It was Kier who sent his gaudy red wagons throughout the East, driven by salesmen who peddled his panacea to farms and hamlets over an extensive area. Though it was well-known and widely used, the demand did not consume the daily production, and the selling costs became so excessive that after two years Kier withdrew his wagons early in 1852 and sold only through druggists.

Looking toward other outlets for his petroleum, Kier had Professor James C. Booth analyze the crude oil and Booth first suggested that Kier offer it as a solvent for gutta-percha, a rubberlike material containing resin. Booth, long-time president of the American Chemical Society, had established the first commercial chemical laboratory in this country in Philadelphia in 1836. After the analysis, Booth determined that by distillation a good illuminant could be produced from the oil and following drawings made by Professor Booth, Kier erected a one-barrel still on Seventh Avenue in Pittsburgh and in 1850 began to distill petroleum. In this manner Kier became the first oil refiner in America. Calling his distilled product "carbon oil," he was able to sell it for $1.50 a gallon.

The only trouble with Kier's product was that there was no suitable lamp in which it could be burned with complete satisfaction. Despairing of finding a proper lamp, Kier experimented himself and made changes in the lamp burners by allowing more air to enter; now his oil burned with a bright light although the odor proved disagreeable to most users. Nearly ten years elapsed before acid treating was discovered and perfected so that the objectionable odor was removed.

But the light made by Kier's "carbon oil" was so clear and the price so reasonable in comparison to previous standards that he had to build a larger still, one of five-barrel capacity. After he had constructed the larger refinery, Kier moved to Lawrenceville, outside the Pittsburgh city limits, for the city council had notified him that no more oil could be distilled within the town because of the danger from explosions and fires.

Mr. Kier's second still can be seen at the Drake Well Museum at Titusville, Pennsylvania, where it is on permanent display. His first still disappeared mysteriously while he was preparing to move from Pittsburgh to Lawrenceville, according to his son, William L. Kier, as quoted in an article appearing in the *Pittsburgh Dispatch* for July 31 and August 7, 1892.

Kier's activity as a refiner did not pass unnoticed and by 1857 he had a competitor in the firm of Nevin, MacKeown & Company, Pittsburgh druggists. This company purchased oil from Tarentum, and refined it in a still erected at nearby Allegheny City. While they were burning some of it in their store, A. C. Ferris of New York City (a coffee and spice dealer) saw it and believed that he could introduce it in the New York market as an illuminant. His initial sale was to Stout & Hand, grocers located at Gowanus in South Brooklyn. Because of receiving many complaints on the odor of his oil, as well as on the dark color of it, Ferris decided that it would have to be improved; finally he adopted the use of a sulphuric acid treatment, followed by caustic soda. This treatment produced an oil of light lemon color and immeasurably improved the odor. During 1858 Ferris had worked so hard and so successfully that he disposed of almost twelve hundred barrels of oil, mostly from the Tarentum wells, although he had imported one hundred and eighty barrels from Lamberton County, Ontario.

Now that an improved illuminating oil could be made from petroleum, the natural thing was to increase the yield of crude. In the attempt, Lewis Peterson, Jr., and a partner purchased land near Tarentum, close to the wells of the senior Peterson. There was a salt well already in existence on this land and the new combination reamed it out and deepened the hole so that it produced an average of three barrels a day. But this entire production was sold to carding mills and therefore did not aid the illuminating oil picture one iota. Wanting still more petroleum, they thought that they would sink a shaft directly to the source of the oil. After much expense and effort had been expended, they found they could not keep water out of the hole, and the prospects looked bleak indeed. They sold the shaft to the Tarentum Oil, Coal and Salt Company, of which A. C. Ferris was one of the owners. Although the company resumed the work, so much gas entered the shaft at a depth of 220 feet that the entire operation was abandoned.

A survey made at this time would have indicated that progress in petroleum was apparently limited because of the scarcity of the raw material.

Year of Destiny

So far as the dawn of the petroleum industry is concerned, the year of destiny was 1853. Events transpired during that year that were responsible for the later accomplishments which really enabled the petroleum industry to get started.

The previous year, 1852, Dr. Francis Beattie Brewer, who had been practicing medicine in northern Vermont, moved to the village of Titusville—a virtual forest wilderness in northwestern Pennsylvania. There was little in Titusville to attract new settlers, for it was a sedate hamlet of three hundred people where pleasures were infrequent—square dances, attendance at church services, and fishing and hunting. The only industries were a gristmill, a lumber business, a woolen mill, and the mills of Brewer, Watson & Company, lumber merchants.

The lumber industry was the reason for the doctor's moving to Titusville, for in 1840 his father, Ebenezer Brewer, had purchased thousands of acres of good timber land along Oil Creek valley. The father had, with Jonathan Watson, built up the firm bearing his name, and Dr. Brewer moved to Pennsylvania to work for the firm as a partner.

In 1853, Dr. Brewer finally had an opportunity to examine the oil spring near his "Upper Mill," located just below Titusville along Oil Creek. Some years before, his father had sent him by a personal messenger five gallons of this "Creek oil," and after using it on some of his patients, the doctor had marveled at its efficacy.

Now he discovered a greater abundance of oil than he had imagined, and he discussed with Jonathan Watson what use might be made of it. The men gave much thought to the matter and finally made an agreement with Mr. J. D. Angier, a farmer residing near the spring. The agreement of July 4, 1853, is the first oil lease of which there is record. The lease read:

> Agreed this fourth day of July, A. D. 1853, with J. D. Angier of Cherrytree Township, in the County of Venango, Pa., that he shall repair up and keep in order the old oil spring on land in said Cherrytree Township, or dig and make new springs, and the expenses to be deducted out of proceeds of the oil, and the balance, if any, to be equally divided, the one-half to J. D. Angier and the other half to Brewer, Watson & Company, for the full term of five years from this date. If profitable.

Angier promptly hired helpers, dug trenches and pits, led the oil into a central collecting basin, and then arranged a series of wooden paddles with which the petroleum was skimmed off the surface. About eighteen gallons a day were collected in this fashion and used chiefly in lighting the mills and lubricating the milling machinery. It is known that the lease did not run the full five years, but it did go over a full year, for Dr. Brewer reported that the first year resulted in the recovery of 1,095 gallons of oil which he thought were worth $821.00.

Dr. Brewer sent some of his "Creek oil" to a friend, Dr. Dixi Crosby, a member of the faculty of the Dartmouth Medical School and a renowned surgeon. Dr. Crosby and Oliver P. Hubbard, professor of chemistry at Dartmouth, examined the crude oil; Hubbard promptly declared it a valuable product but doubted that a sufficient quantity of it would ever be available as an article of commerce.

Within a few weeks, George H. Bissell, a Dartmouth graduate and a New York lawyer, returned to Hanover for a visit, and saw the sample of oil in Crosby's office. At once Bissell became intrigued with the oil and wondered about its possibilities. Why, he asked, inasmuch as it seemed to resemble coal oils, could it not be used as an illuminant if sufficient supplies could be found?

As the year 1853 drew to a close, the stage had been properly set for the eventual drama of petroleum.

A Man With an Idea

George Bissell discussed his petroleum ideas with his law partner, Jonathan G. Eveleth, and they agreed to send Dr. Crosby's son to investigate the largest oil spring near Titusville, Pennsylvania.

Albert H. Crosby met Dr. Brewer in Titusville and the two went down Oil Creek as far as the farm of Hamilton McClintock where they saw the most famous of the oil springs. Crosby was enthusiastic about what he saw, and promptly suggested to Dr. Brewer that the whole farm be purchased at the offered price of seven thousand dollars. But the money was not readily available and the doctor explained to Crosby that he did not want to take cash from his lumber operations in order to invest it in anything as indefinite as oil. Crosby replied that he "would rather have McClintock's farm than all the timber in Western Pennsylvania."

Once back in the village, Brewer and Crosby agreed that Brewer, Watson & Company would sell the Hibbard farm, the site of the principal oil spring, for five thousand dollars, a price which included the oil rights on nearby lands. For their part, Bissell and Eveleth were to form a company and develop the property and spring. The stock company was to have a capital of $250,000, and one-fifth of the stock was to go to Brewer, Watson & Company.

Young Crosby returned to New York and reported to Bissell; his report was a glowing one and he apparently was so excited that, when he explained Dr. Brewer's offer, he was careless and erred in stating that the purchase sum was to be taken from Brewer's share instead of from Treasury stock. At the same time, he failed to emphasize Brewer's insistence upon good security for the payment of the sale price. To make the confusion still greater, a few days later he wrote Brewer that Bissell and Eveleth were accepting the terms.

Thinking the matter practically settled, Dr. Brewer went to New York in September, 1854, to sign the required papers. Much to his amazement, he soon discovered that Bissell and Eveleth were not ready to sign, for they could not believe the statements of abundance reported by Crosby. In an attempt to clarify things, Dr. Brewer gave the two men a minute verbal report on the lands, springs, method of collecting the oil, and his estimated costs. When he found them still doubtful, he kept his proposition open until one or both of them could visit Titusville to see for themselves what was being offered.

Bissell and Eveleth went to New Haven before starting for Pennsylvania, because a retired minister, the Reverend Anson

Sheldon, thought they could interest some New Haven capitalists in taking over the entire tract. While staying at the Tontine Hotel in that city, the partners met James M. Townsend, energetic president of the City Savings Bank, who introduced them to other well-known citizens.

The New York lawyers were good salesmen with previous experience in several lines of endeavor. They interested James Townsend to the point where he and his friends and associates decided that there was money in developing petroleum. These Yankee participants were willing to invest, but their New England cautiousness forced them to insist upon inspection of the oil by qualified scientists. Also, they wanted the land involved in the deal to be looked over carefully.

Luther Atwood, the Boston chemist who had done much work in developing coal oil, was first to analyze the oil. Rather promptly he reported it to have excellent qualities.

Benjamin Silliman, Jr., professor at Yale College, was employed to make a more extensive analysis of the oil. Years earlier, his father, Benjamin Silliman, Sr., had been interested in oil and had even visited the Seneca oil spring near Cuba, New York, during September, 1832. The Yale chemist spent five months on his work, partly because his still exploded and the company had to provide new equipment for him.

Meanwhile, Eveleth had gone to Titusville and inspected all the land and the known oil springs that would be included in the purchase of the Hibbard farm and adjoining land rights. Completely satisfied with all he had seen, Eveleth waxed more enthusiastic than Crosby had ever been.

On November 10, 1854, Dr. Brewer deeded the Hibbard farm to Eveleth and Bissell along with permission for them to secure oil on other lands of Brewer, Watson & Company; he retained for his firm the right to use the millrace and to carry on lumber and farming operations. No cash was used in this deal, the two New Yorkers giving their notes for the land; because Albert Crosby could not present his share of the purchase requirements, he was dropped from the scheme.

The first oil company in the United States was the Pennsylvania Rock Oil Company of New York, incorporated at Albany on December 30, 1854. Seven trustees were empowered to run the company, but Dr. Brewer was the only one who was not a mere figurehead. Eveleth and Bissell deeded their property to the trustees on January 16, 1855, and the new owners hired J. D. Angier to continue his work. Strangely enough, the supply of oil from Angier's trenches and vats fell off appreciably.

A stock-selling program was inaugurated for the new oil company by Eveleth and Bissell, but money was tight and sales were few. Crosby, now a reporter for a New York City newspaper, was given a little stock because of his previous interest and work, also two hundred shares to sell. Instead of trying to sell these shares, Crosby exerted his energy attempting to peddle his own stock. When Eveleth and Bissell learned that Crosby had offered his stock at one-fifth of the $2.50 per share value, they purchased his shares, and he disappeared forever from the petroleum picture.

Unable to devote their full time to stock selling, the two lawyers were assisted by the Reverend Mr. Sheldon in New Haven, who truly proved an indefatigable worker. But despite all efforts, the stock did not sell.

Finally Professor Silliman's report was finished and ready for delivery on April 16, 1855. Silliman left the report with a friend in New York and instructed him not to turn it over until Eveleth and Bissell had guaranteed arrangements for the payment which amounted to $526.08. Eveleth used his own money to secure the report after Sheldon and he had made futile attempts to raise the sum.

Silliman's report was beneficial in every way. He made such a complete study of petroleum that it is today still regarded as a classic in technical circles. The manuscript was rushed to a New Haven printer, and in a few days copies of the pamphlet were distributed throughout New Haven and sent to prospects elsewhere. Titled "Report on the Rock Oil, or Petroleum, from Venango Co., Pennsylvania," the report proved the turning point in the petroleum venture. Perhaps the most important paragraph was this:

> . . . It appears to me that there is much ground for encouragement in the belief that your Company have in their possession a raw material from which, by simple and not expensive process, they may manufacture very valuable products.
>
> It is worthy of note that my experiments prove that

> nearly the *whole* of the raw product may be manufactured without waste, and this solely by a well directed process which is in practice, one of the most simple of all chemical processes.

Doubts about the value of the raw material were of course dispelled, for men of Professor Silliman's character were cautious in their statements.

The oil company stock sold better than before but not in large enough quantities. Part of the trouble stemmed from the feeling against joint stock companies, many of which had lost money at a time when the New York State laws made stockholders liable for the debts of the company. As Connecticut law did not have this proviso, the idea was broached that if the company were reorganized under Connecticut laws, New Haven capitalists would purchase the stock. As a result, the New York firm was abandoned and the Pennsylvania Rock Oil Company of Connecticut was formed on September 18, 1855.

In this new setup, Professor Silliman was president, Eveleth and Bissell retained a controlling amount of stock, and a majority of the directors were selected from New Haven stockholders. The fact that Professor Silliman not only entered the new firm but also allowed himself to be elected president added prestige and created additional interest.

George H. Bissell now persuaded Rensselaer H. Havens of the real estate firm of Lyman & Havens, of New York, that his firm should do exploratory work at Titusville and attempt to produce petroleum. The Pennsylvania Rock Oil Company leased its Titusville lands to Lyman & Havens for fifteen years for twelve cents a gallon royalty.

The firm of Lyman & Havens found itself in financial difficulties before it could commence work at Titusville; it foundered and finally crashed in the panic of 1857. Seeking a way to rid itself of the obligation to do any work at Titusville, it discovered that the title of the Pennsylvania Rock Oil Company was imperfect because the wives of two grantors had failed to sign the purchase papers (if their husbands died, the women would be entitled to dower right). Upon these grounds, Lyman & Havens gave up their lease and removed themselves from the picture.

E. L. Drake

At this point in the story we introduce Edwin Laurentine Drake. He boarded at the Tontine Hotel in New Haven following the death of his wife in 1854; one of his fellow lodgers was James Townsend. When Drake enters our story in 1856, he was thirty-eight years old, having spent his first nineteen years on farms in New York and Vermont.

At the age of nineteen he left home with a common school education and little else but courage to guide him on his way. His experiences were varied over the next several years: for a time he was clerk on a Great Lakes steamer, worked on an uncle's farm in Michigan, became a hotel clerk in the same place, and next clerked in stores in New Haven and New York. Because of the illness of his wife, the family moved permanently to her home town, Springfield, Massachusetts, where Drake was express agent for the Boston & Albany Railroad. In 1849 he became a conductor on the New York & New Haven Railroad and resided in New Haven. After the death of Mrs. Drake he broke up his home and moved to the hotel.

Townsend sold Drake two hundred dollars worth of stock in the Pennsylvania Rock Oil Company of Connecticut, an amount which represented all the savings Drake had. Illness forced him to quit his work in 1857.

After Lyman & Havens gave up their lease, James Townsend was convinced that if anything was to be accomplished, he had better see to it that it be done. Accordingly, without consulting anyone else, Townsend decided that he should send someone to Pennsylvania, first, to secure the signature of the two ladies to the title to the Titusville lands (which Lyman & Havens had discovered was imperfect), and second, to visit Titusville, inspect the property, and make a secret report.

His friend Drake, now partly recovered from his illness, and with a railroad pass insuring free transportation, was certainly the man to do this work. Townsend furnished the money and instructions, and Drake headed for Titusville—and a niche in history for all time.

After arriving at Erie, Pennsylvania, he went to Titusville on the mail stage, traveling over some of the roughest roads to be found. In Titusville he learned that he was now "Colonel" E. L.

Drake. Friend Townsend, with a fine flair for the dramatic and with a psychologist's knowledge of what prestige can sometimes accomplish, had forwarded legal documents and other mail to Drake by addressing the envelopes boldly to "Colonel E. L. Drake." From this time on, Drake was a "Colonel" though he actually was never a military man of any kind.

As the next stage from Titusville to Erie was not due for three days, the visitor finished his business and then proceeded leisurely to inspect the oil springs and property, concerning which he was as deeply impressed as Albert Crosby and Jonathan Eveleth had been before him.

On to Pittsburgh went Drake where he perfected the land title by getting the two missing female signatures. Neglectful of no opportunity, he proceeded to Tarentum and investigated the salt wells and operations there, then rushed back to New Haven and proclaimed to Townsend that a future and a fortune were waiting to be made at Titusville.

The Seneca Oil Company

With the two other New Haven Directors, James Townsend leased the oil springs to Drake and E. B. Bowditch of New Haven for a royalty of twelve cents a gallon for oil produced. This arrangement was started on December 30, 1857, and as soon as it was completed, the New Haven interests formed the Seneca Oil Company of Connecticut.

Incorporated on March 23, 1858, the new firm named Drake, the largest stockholder, as president although two other New Haven men also held shares. The name of James Townsend appeared nowhere, and yet he was the moving spirit. Oil business, highly speculative in nature, was not the best advertising medium for bank president Townsend.

Drake retained 656 shares of stock and turned back the rest to the parties for whom he had held the shares during the organizational period. Bowditch and Drake signed their lease over to the Seneca Oil Company, and Drake was hired at one thousand dollars a year as general manager. It was the largest salary he had ever received. The wily Townsend was now in complete command, for by putting together this new company and by securing the lease from Bowditch and Drake, he had in one stroke eliminated Dr. Brewer, Bissell, Eveleth, and other stockholders outside New Haven from actual participation in the enterprise.

Progress

At long last, definite progress was about to be made. The Seneca Oil Company directed Drake to go to Titusville in order to produce petroleum, and made one thousand dollars available to him for expenses.

In May of 1858, Drake, who had remarried, took his wife and two children to Titusville where they lived at the American Hotel for $6.50 per week.

Quickly Drake reopened the pits and trenches which Angier had constructed, and six weeks later he reported to Townsend:

> Here I am digging along yet in search of oil and other valuables. The month of May was a hard one, and the first eleven days of June, but since then we have had dry weather, so that I have got the start of the water, and am now gathering about ten gallons of oil per day—at the same time sinking a well for the purpose of taking what oil there is on the island. I have found some difficulty in getting a borer. All were engaged on jobs that will last until fall. Yesterday Dr. Brewer wrote me that he could get one for me at Allegany, who will bore and tube for three dollars per foot, which is the best offer I have had. I wrote the Doctor to send him along at once. Yesterday I set some men to opening a new spring, so that things begin to look greasy.

What prompted Drake to drill an artesian well in order to seek petroleum? Although no absolute answer is possible, it is thought likely that the idea was given to Drake by George H. Bissell. The story, first told by oil historian J. T. Henry in 1873 and still well-known through the oil country, is that Bissell paused beneath an awning one day in New York City in 1856 to escape the blazing sun. In the window he saw one of Sam Kier's advertisements resembling a bank note and showing derricks used in boring for salt brine. Closer inspection was made when Bissell went into the store and the druggist gave him one of the circulars. As he studied the circular and looked carefully at the derricks, an inspiration came to him in the thought that derricks on the clever advertisement represented the way to drill wells at Titusville in order to recover quantities of petroleum.

Though the story could be apocryphal, Henry knew Bissell personally as well as many of the other oil pioneers, and he must have had a good basis for the report.

By the middle of August, 1858, Drake told Townsend: ". . . I am satisfied that boring is the cheapest." At this time he had already ordered an engine to be delivered, his pump house was framed, and he asked for another thousand dollars to pay for the equipment and building. Nearly all of that sum was sent to him, part of it in October and the balance in December.

The "borer" about whom Dr. Brewer had written never appeared, and so Drake went to Tarentum and hired a driller. The regular drillers were busy, and most of them appreciated too well the virtues of rye whiskey. Drake's man never arrived in Titusville.

The "Colonel" went to Tarentum again late in August 1858 to hunt his missing employee but failed to locate him. He contracted with another driller who was just finishing a salt well, but sudden trouble developed on this well and the driller could not get away. Drake could not find another driller and with winter close at hand, he decided to wait until spring, meanwhile getting his engine set up and his boiler connected and everything ready for work.

Anxious about the future task, Drake once more journeyed to Tarentum, this time in February, 1859, and for the third time hired a well driller who, like the others, never appeared. It was little wonder that Drake was now prepared to forget about boring and to write off all drillers as crazy men with no sense of honesty.

Most fortunes change suddenly. Drake received a letter from Lewis Peterson, Jr., of Tarentum, with a recommendation for William A. Smith, a blacksmith of Salina, fifteen miles east of Tarentum, who had previously made tools for the Kier and Peterson wells, who had done drilling, and who had experience in "fishing" for lost tools. Rushing south once again, Drake contracted with Smith to come to Titusville and drill a well for $2.50 a day. First, Drake bought iron for $30.80, and Smith made drilling tools from it in his own shop.

When the tools were finished, Drake sent a wagon to Salina; it returned to Titusville carrying not only the drilling tools but also "Uncle Billy" Smith, his fifteen-year-old son Samuel, and his daughter Margaret Jane. The residents did not know it, but the wagon rolling through Titusville on that May day of 1859 was the forerunner of events which changed Titusville and the world.

Activity

There was still trouble to be overcome. Drake's men had been digging a hole, cribbing it to prevent "cave-ins," but they could not keep the water out. The well was only a hundred and fifty feet from Oil Creek and below the level of the stream. No matter how much the pump was used, more water seeped in.

Drake obtained sections of pipe ten feet long from Erie and with a battering ram drove these sections down through the shifting sands and clay. This was the first employment of a drive pipe in an oil well and it is used today in exactly the same fashion. After the six-inch pipe had been put down to eliminate the water, Smith commenced drilling his well through this pipe, with the operations starting in the middle of August.

Slowly, sometimes less than three feet a day, the drill went downward. It was impossible for Drake to have missed the jibes of the local residents; there was a supreme lack of confidence in the entire venture with even the astute Dr. Brewer regarding Drake's work as a great joke. To add to Drake's problems, after having put nearly $2,500 into the experiment, the New Haven people decided not to risk more; Townsend directed Drake to pay all bills and to close down the work. But before receiving this word from Townsend, Drake had borrowed five hundred dollars from the Dick Bank at Meadville, Pennsylvania, because he was without funds; his two closest friends, Peter Wilson and R. D. Fletcher, endorsed the note for him.

Success

Work was stopped late Saturday afternoon August 27 at the well, and the next day "Uncle Billy" was inspecting the well late in the afternoon and saw an oily fluid close to the top of the pipe. He made a rough tube and lowered it into the pipe. What he brought forth was black gold.

"Uncle Billy" was excited at his sudden discovery of final success and sent his son to the Upper Mill where he yelled at the workers, "They've struck oil!" The mill operations stopped, and some of the workmen rushed to the derrick to see what had happened. They saw Smith dipping out oil faster and in larger quantities than they had ever dreamed was possible.

The news spread along the stream and into Titusville but "Colonel" Drake did not get to the well until the next morning. When he did arrive, he saw Smith surrounded by filled barrels, tubs, and jars of oil. Drake tested the well himself and was pleased with the results but he was not excited. He was calmness personified. Titusville now changed its collective mind, happy in the fact that the smart "Colonel" had struck oil nearby. At least six different dates have been given for the discovery of oil by Drake; the most accurate explanation is that Drake struck oil on Saturday, August 27, 1859, but it was not known until Sunday, August 28. The news became general in the vicinity August 29.

The first newspaper report of Drake's success was a paragraph in the *New York Tribune* on September 13, 1859, which stated:

> Titusville, September 8th, 1859.—Perhaps you will recollect that, in 1854, there was organised in the city of New York a company under the name of the Pennsylvania Rock Oil Company, which for some good reason passed into the hands of some New Haven capitalists, and was by them removed to New Haven. In 1858 the directors leased the grounds and springs to E. L. Drake, well known on the New Haven railroad. He came out here in May, last year, commenced to bore for salt, or to find the source of the oil, which is so common along the banks of Oil Creek. Last week, at the depth of 71 feet, he struck a fissure in the rock through which he was boring, when, to his surprise and the joy of everyone concerned, he found he had tapped a vein of water and oil, yielding 400 gallons of oil every 24 hours. The pumps now in use throw only five gallons per minute of oil and water into a large vat, when the oil rises to the top, and the water runs out from the bottom. In a few days they will have a pump of three times the capacity of the one now in use, and then from 10 to 12 hundred gallons of oil will be the daily yield. The springs along the stream, I understand, have been mostly taken up or secured by Brewer and Watson, the parties who formerly owned the one now in operation. The excitement attendant on the discovery of this vast source of oil was fully equal to what I ever saw in Cali-

> fornia when a large lump of gold was accidentally turned out.
>
> MEDICUS

From the tone of the article and the signature, many writers thought that this came from the pen of Dr. Brewer.

In the oil region, the *Crawford Journal* at Meadville carried several lines about the well on the very day the above-quoted article appeared in the New York paper. But not until September 21 did any news appear in Franklin's *Venango Spectator* and not until October 1 in Warren's *Mail;* on these respective days, the two papers published the same article which was used by the *New York Tribune* earlier.

It was nearly two months after the event that New Haven papers carried the news, for the stockholders there wanted to be certain that the supply of oil would not be exhausted within a few days.

Fortunate indeed was the timing of Drake's discovery—it came when the nation was about to be embroiled in war and when mechanized expansion was beginning. Drake happened to drill in the only spot in the oil country where he could have found oil at a depth as shallow as 69½ feet.

FUROR

On the Monday after the striking of oil, Jonathan Watson mounted his horse and dashed down Oil Creek leasing farms on both sides for future development. Brewer, Watson & Company lost no time in purchasing or leasing lands where there were oil springs or seepages. And George Bissell, who received the news in New York by telegram, bought all the Pennsylvania Rock Oil Company stock he could, rushed to Titusville, and proceeded to tie up lands along Oil Creek and those bordering the Allegheny River.

Drake took things in his stride. He caught up on his fishing and refused to secure any lands, saying succinctly, "I have tapped the mine." On October 7, while Drake was in Erie, "Uncle Billy" took his lantern down to the tank to see how the oil was flowing. The gas ignited, and burned the tanks, oil, derrick, and all the buildings. Smith was lucky to escape with his life. The news reached Drake while he was enroute home the next morning.

After hearing the whole story, he pondered a minute and then asked his informer whether the hole had burned. Obviously it had not, and so Drake and Smith rebuilt and within a month the well was pumping again.

By the end of 1859, the oil country had become pandemonium. Leasing was going on madly, with the royalties running from one-tenth to one-quarter of the production, but this rate was somewhat stabilized at one-eighth of the oil. In many instances, a cash bonus was paid to the lessor, the amount depending upon the considered worth of the territory involved. The lessee nearly always promised to drill a well promptly, or occasionally several wells; the size of the hole and the depth of drill varied greatly. Leasing time ran from one year to perpetuity.

Exit the Colonel

As other wells went down and the oil came up, Drake realized his mistake too late, for the best lands were gone. Because of his great prestige he could still have associated himself with many good companies but he seemed content to serve as justice of the peace at Titusville and to act as oil buyer for Schieffelin Brothers of New York.

Shortly after he came to Titusville he bought twenty-five acres of land from Jonathan Watson, and now, following his discovery, he found these acres to be in the very heart of the town. Unable to meet the three-thousand-dollar mortgage covering the land, he sold it for twelve thousand dollars in 1863. The Seneca Oil Company dispensed with his services in March, 1860, and paid him one thousand dollars for the use of his name on oil barrels; he was at the same time let out as president and general manager of the company.

In 1863 Drake took his money and went into partnership with a New York stock broker; in less than three years Drake's twenty thousand dollars were gone, he and his partner were out of business, and his health was impaired. He took his family to Vermont in an attempt to regain his health but without success.

Told that living near the sea might prove beneficial, Drake moved to Long Branch, New Jersey, where he resided in a cottage lent to him by a friend. His spinal affliction grew constantly worse, he was without money, and he needed the help of his wife to care for him. She took in sewing to provide the family with the bare necessities of life.

One day in 1869 Drake was walking a New York street in an effort to find employment for his oldest boy and encountered a friend from the oil country, Z. Martin, a Titusville hotel owner. Martin discovered that Drake walked with the greatest difficulty, was wearing old clothes, and had only a few cents of change in his pocket. Promptly he gave Drake some money and rushed back to the oil country where he told of Drake's sad plight.

A public meeting was called by the oil men, and more than four thousand dollars were raised and sent to the Drake family. In 1873 Pennsylvania's state legislature provided Drake with an annual sum of fifteen hundred dollars which went to his wife after his death. Drake now moved to South Bethlehem, Pennsylvania, and his condition became so bad that he could scarcely move. In constant pain, death came in November, 1880.

In recent years there have been some attempts to gloss over the part "Colonel" Drake played in discovering petroleum, but it should never be forgotten that had it not been for this stubborn man who did not know how to say "Stop! Enough!" the discovery of petroleum would have been delayed for years, or it might still be unknown. It was Drake who did not fail when drillers failed him, who kept on going even when he personally had to borrow funds to do so, and who invented the "drive pipe" to prevent the top soil of oil wells from caving and from ruining the hole.

What is perhaps most difficult to understand is the reason why he failed to take advantage of the wonderful opportunities he had to make a fortune from petroleum. His health could not have been at the best, and his long efforts before success was won must have left him exhausted; at least, he acted as though these statements were true. But no matter what the reason, Drake, and Drake alone, must be considered to be the discoverer of petroleum.

Early Wells

In the vicinity of Titusville, the men were poor but inventive and strong of back and mind. Unwilling, and very often unable, to purchase equipment for steam drilling, boilers, fuel, and the other necessary paraphernalia, many men drilled their own wells by the "kicking down" method, a long and tedious task. "Kicking down" a well was done by arranging a fifteen-foot length of elastic pole made of ash or hickory, over the well hole and working it as a fulcrum by attaching stirrups to the end of it. Two men each placed a foot in the stirrups and by a kind of kicking process brought the pole down and produced the motion necessary to work the bit. The strokes were rapid, and the elasticity of the pole raised the tool after each stroke.

The first well after Drake's was drilled by Boone Meade and William Barnsdall of Titusville and by Henry R. Rouse of Enterprise. On the Parker farm, just above the Drake well, they struck a five-barrel-per-day well in November but continued drilling. William H. Abbott, a merchant from Newton Falls, Ohio, newly arrived in the oil region, purchased an interest in the well. In February, 1860, oil was found at a depth of 112 feet and the well became known for its strange behavior; when the pump stopped, the well would often throw a stream of oil eight feet into the air. A group of visitors was inspecting the well when it suddenly broke loose and drenched them with petroleum. But the idiosyncrasy of the well did not dismay the owners, and in the first four months of its production they netted thirteen thousand dollars.

The third well was put down by David Crossley on the opposite side of Oil Creek from the Drake Well and slightly below it. In March, 1860, he found oil at 124 feet. Thomas A. Gale, whose book *The Wonder of the Nineteenth Century! Rock Oil in Pennsylvania and Elsewhere* was the first published on petroleum following Drake's discovery, said:

> A splendid thing is the Crossley well! A diamond of the first water! Enough of itself to silence the cry of humbug; to create a sensation among rival interests; to inspire hope in many toiling for the subterranean treasure . . . .

The Williams well was the most spectacular of the four earliest wells. Drilled by men from Warren and located only two hundred feet from the one owned by Meade-Barnsdall-Rouse, oil was encountered at 145 feet, and the gas pressure was so great that ten barrels of oil daily were tossed into the air at intervals. Struck during the summer of 1860, it drew large crowds of interested spectators and amazed all by the loud and constant rumblings that came up from the bowels of the earth. The editor of the *Crawford Journal* thought, "The coolest nerve could not witness the scene without excitement."

News of Drake's well, of work on others, and of wealth waiting to be made spread quickly through western Pennsylvania and eastern Ohio, and every day eager men poured into Titusville and the surrounding country. The craze for land on which to drill traveled down the river to Franklin and up the Allegheny to Tidioute in Warren County.

The advent of the Civil War prevented some people from moving into the oil region but too many arrived as it was. During the conflict, the North was early cut off from turpentine, and petroleum derivatives served as substitutes in paints and varnishes. Oil products were used also in some chemicals and pharmaceuticals.

At the end of the Civil War, discharged soldiers with pockets full of back pay and looking for work thronged into the domains of Petrolia. Petroleum appealed both to practical businessmen and to those seeking wealth in a hurry through speculation. And unlike the gold regions of California, western Pennsylvania was easily reached, for oildom sat in a rough triangle between Buffalo, Cleveland, and Pittsburgh.

This turmoil and influx of people with the urge to drill created Babylon, Pithole City, Tip Top, Red Hot, Petroleum Centre, and a host of boom towns that made gold-rush towns like Angel's Camp, Rich Bar, and Bogus Thunder seem like spots without reproach.

Disaster

Of all the early oil men, no man was more outstanding than Henry R. Rouse. Born in Westfield, New York, and educated in the academy there, he studied law and then decided to give it up because of a slight speech defect. He traveled to Tidioute, Pennsylvania, on foot, became a schoolteacher, received his wages partly in shingles, and in this manner entered the lumber business.

Besides being a lumberman, he was soon a merchant at Enterprise, and later was a member of Pennsylvania's House of Representatives. As one of the triumvirate who drilled the second oil well, he prospected widely and heavily, although he was active in the oil business for only eighteen months.

Near the lower end of Oil Creek, on the farm of John Buchanan, Rouse and John L. Mitchell had drilled a 150-foot well in 1860; since production had never been over twelve barrels a day, the location was sublet in 1861 to Little & Merrick, who promptly began to drill deeper.

Late afternoon on April 17, 1861, Rouse and George H. Dimick, his confidential agent and relative, were at Anthony's Hotel, a small shanty boardinghouse near the well, waiting for supper. A workman ran in and yelled that Little & Merrick had struck a big pocket of oil. Rouse and others headed toward the well. Dimick, practical as he always was, went in another direction to secure a supply of barrels, for he knew that no provision had been made for storage.

The well was spouting oil at a rate of three thousand barrels, while sixty men were watching the ground which was being rapidly covered by more than a foot of oil. The accumulated gas suddenly exploded and instantaneously an acre of ground was flooded with crude oil; two wells, tankage, and a barn were in flames. Rouse, who was only twenty feet from the well, dashed toward a small ravine. He jerked a packet of valuable papers from his pocket and threw them beyond the fire where they were later rescued.

A few steps were all he ever took before he fell. He got up and fell again, utterly exhausted from the intense heat and the flames which were burning his body. Two men barely pulled his charred body to safety, and in excruciating pain he lived for five hours. He dictated his will containing twenty-three clauses and left most of his fortune to the Commissioners of Warren County for the relief of the poor and for the improvement of roads. Today the original copy of his will can be seen at the Warren County courthouse, and his charred boots, worn at the time he was burned, are on display at the Rouse Home, Youngsville, Pennsylvania. After Rouse's will had been written as he directed, he was too feeble to sign it but was able to scratch a crude mark on it which was properly witnessed by a doctor and others in attendance.

This drastic fire, commonly called "the Rouse fire," was the first major one in the oil region and a demonstration of the dangers encountered in early drilling. The fire lasted three days and was put out by being smothered with earth and manure. Of the eight men at the hotel when news came of the strike, Rouse was the only one burned to death, and Dimick was the only one to escape injury. Nineteen men lost their lives, and seventeen others were injured, eight being maimed or badly disfigured.

To Market, To Market

Without a market, a raw product stays raw and generally is rather worthless. In the early days of oil, the crude flowed into wooden tanks and then into wooden barrels. Six barrels were loaded on a strong wagon, and the teamster hoped to get them to the nearest refinery or railroad shipping point. Initially, there were few roads; the loads were heavy, the roads rough, the ruts so deep and sticky with mud that the combination was quite enough to cause the loss of one-third of the oil.

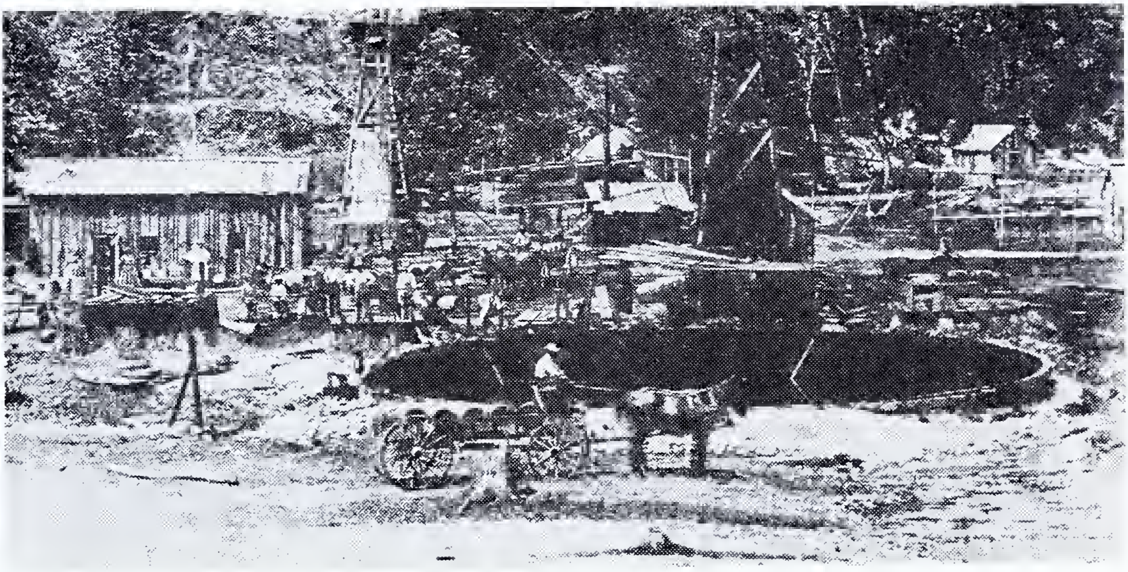
With over four thousand teamsters hauling barreled crude oil, courtesy of the road was an unknown virtue. While the teams were active, the roads remained.

Wholly unclassable
Amost impassable
Scarcely jackassable.

But fate must have known where oil would be struck, and arranged to have the Allegheny River and tributaries handy, stretching like a net over the oil fields. Of them all, the Allegheny River and Oil Creek held the greatest benefits for the petroleum industry, because as the demand for petroleum increased, the teams could not handle it all and transportation by water became essential.

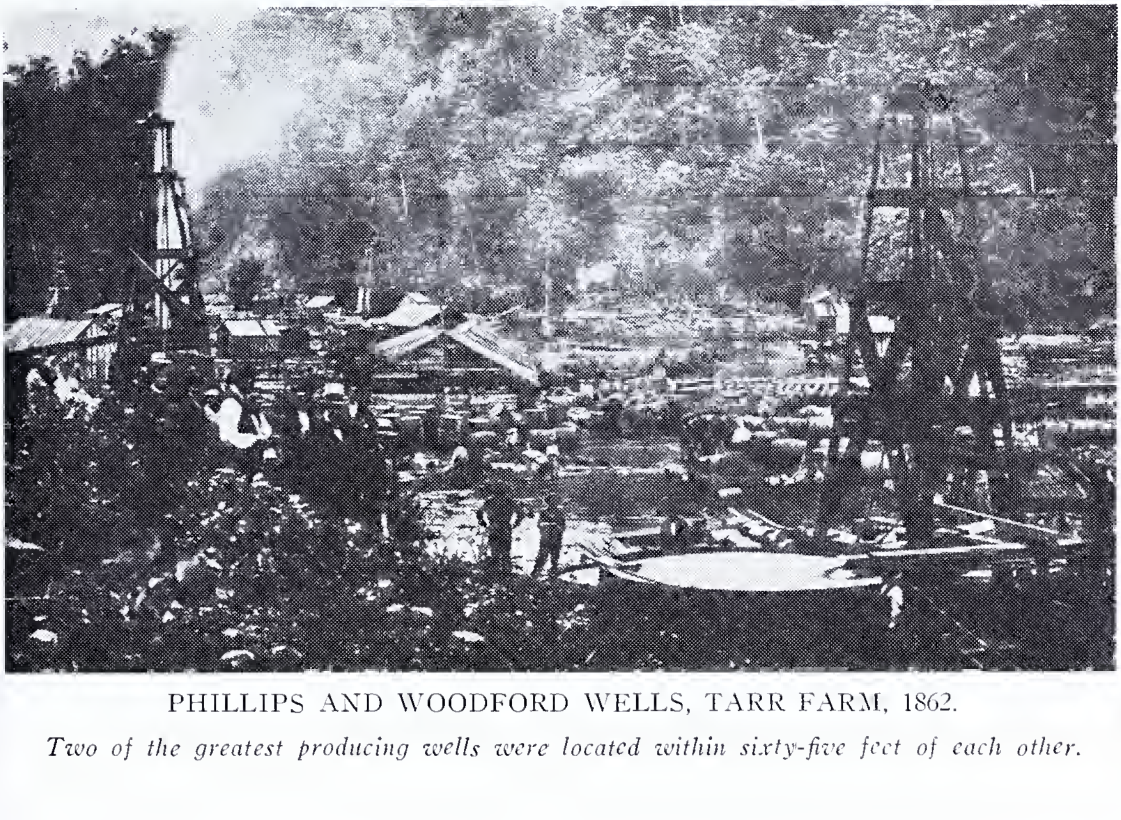
Oil was run from wells through plank troughs directly into partitioned flatboats which served as floating oil tanks, especially when barrels were scarce. When barrels were convenient, the oil went into them, and they went into the flatboats, the number of barrels depending on the size of the boat and the willingness of the owner to gamble that the load would float down to Oil City in safety or with minimal loss.

Early in 1861, fifteen steamers and many towboats were plying the Allegheny River between Oil City and Pittsburgh, hauling nothing but oil. But on the smaller streams like Oil Creek, flatboats needed from twenty-two to thirty extra inches of water to clear the bottom; and to get the extra water for the oil fleet, a



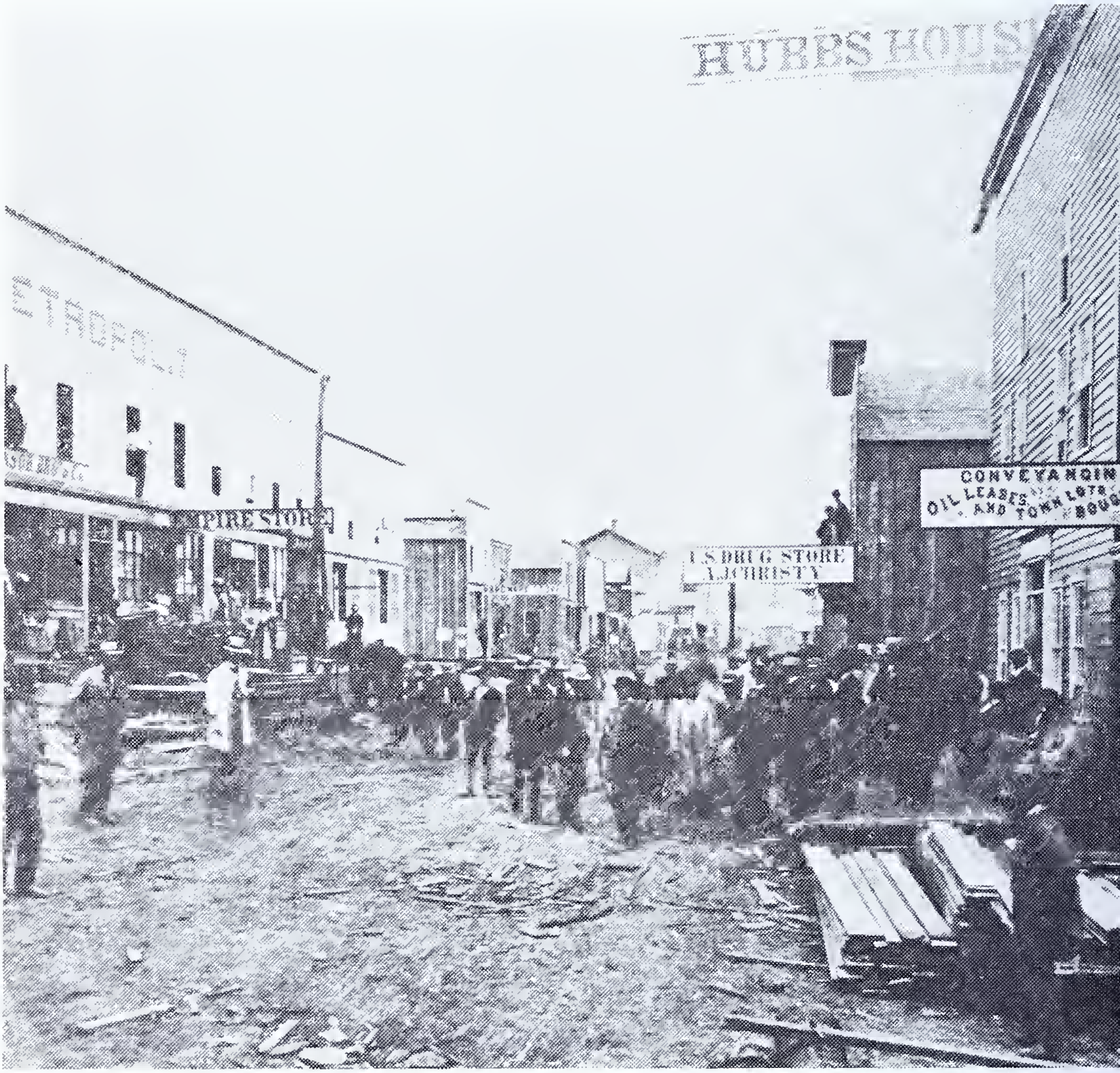
UNDERGROUND STORAGE TANKS ON THE TARR FARM, 1862.

Over 4,000 barrels of oil daily came from the Phillips and Woodford wells on this farm during 1862. In an attempt to store this oil, underground tanks lined with timbers were constructed.



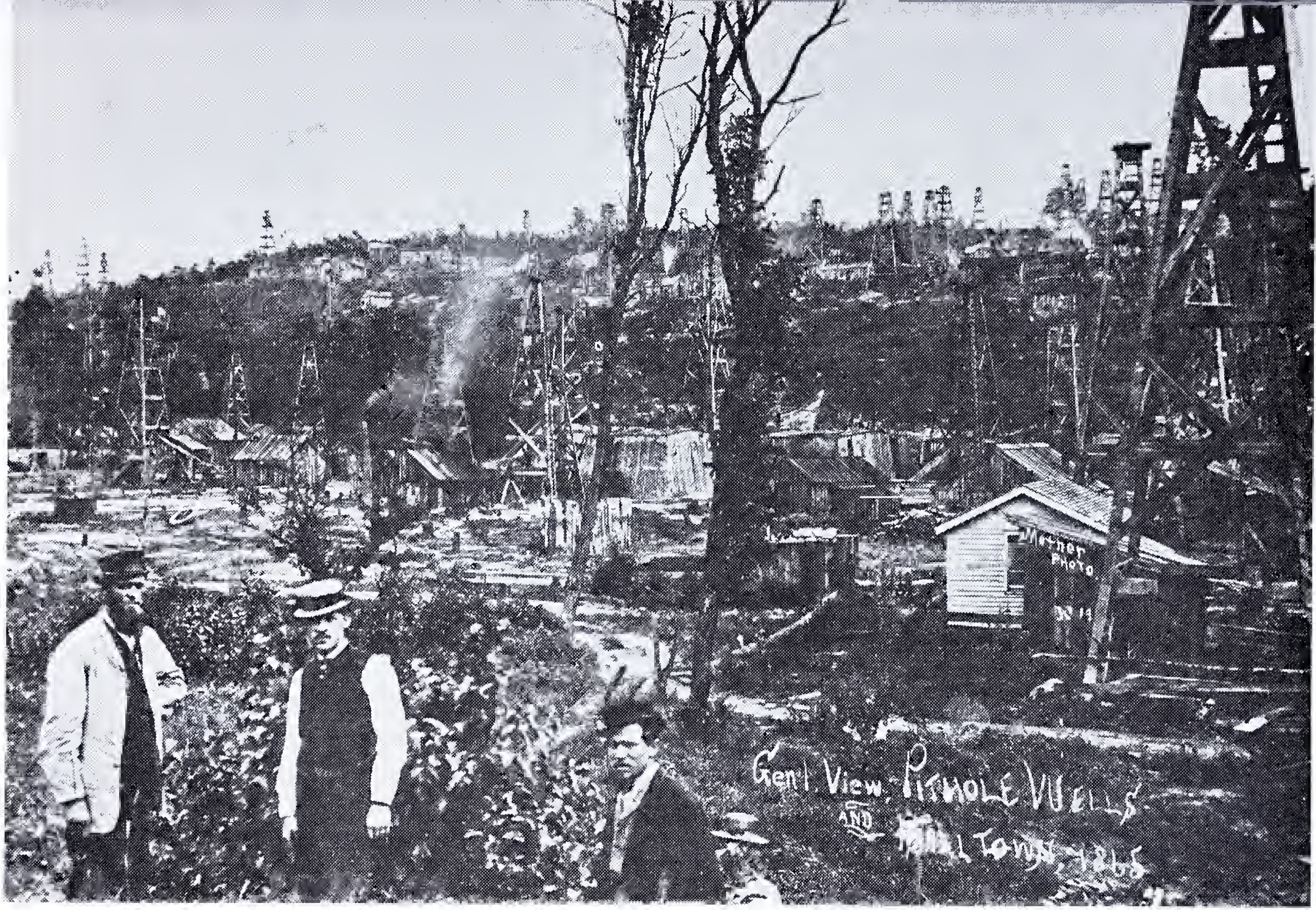
PHILLIPS AND WOODFORD WELLS, TARR FARM, 1862.

Two of the greatest producing wells were located within sixty-five feet of each other.



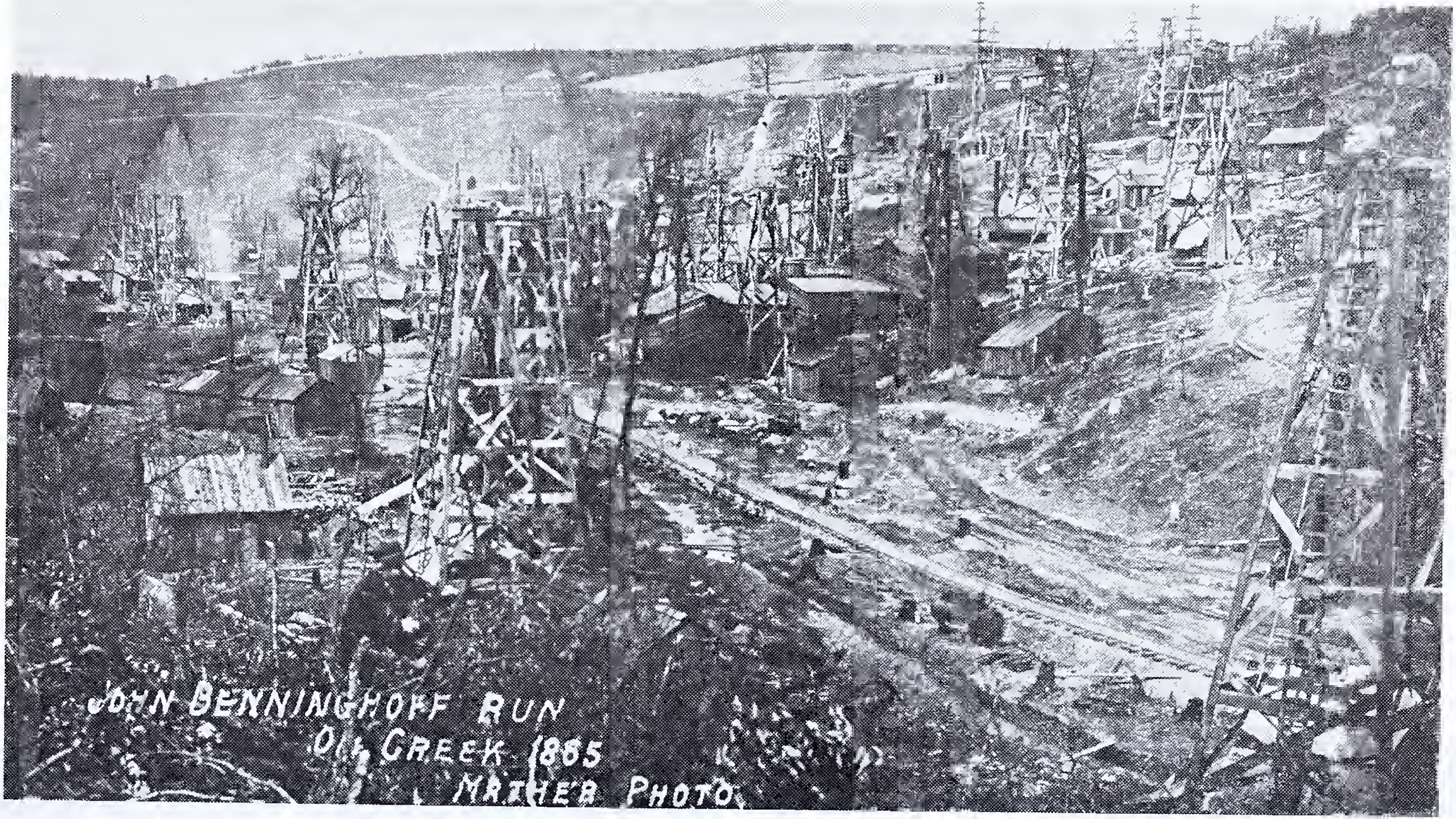
HOLMDEN STREET, PITHOLE CITY, PA., 1865.

This photograph, taken in the summer of 1865, shows Pithole in its growing stage.



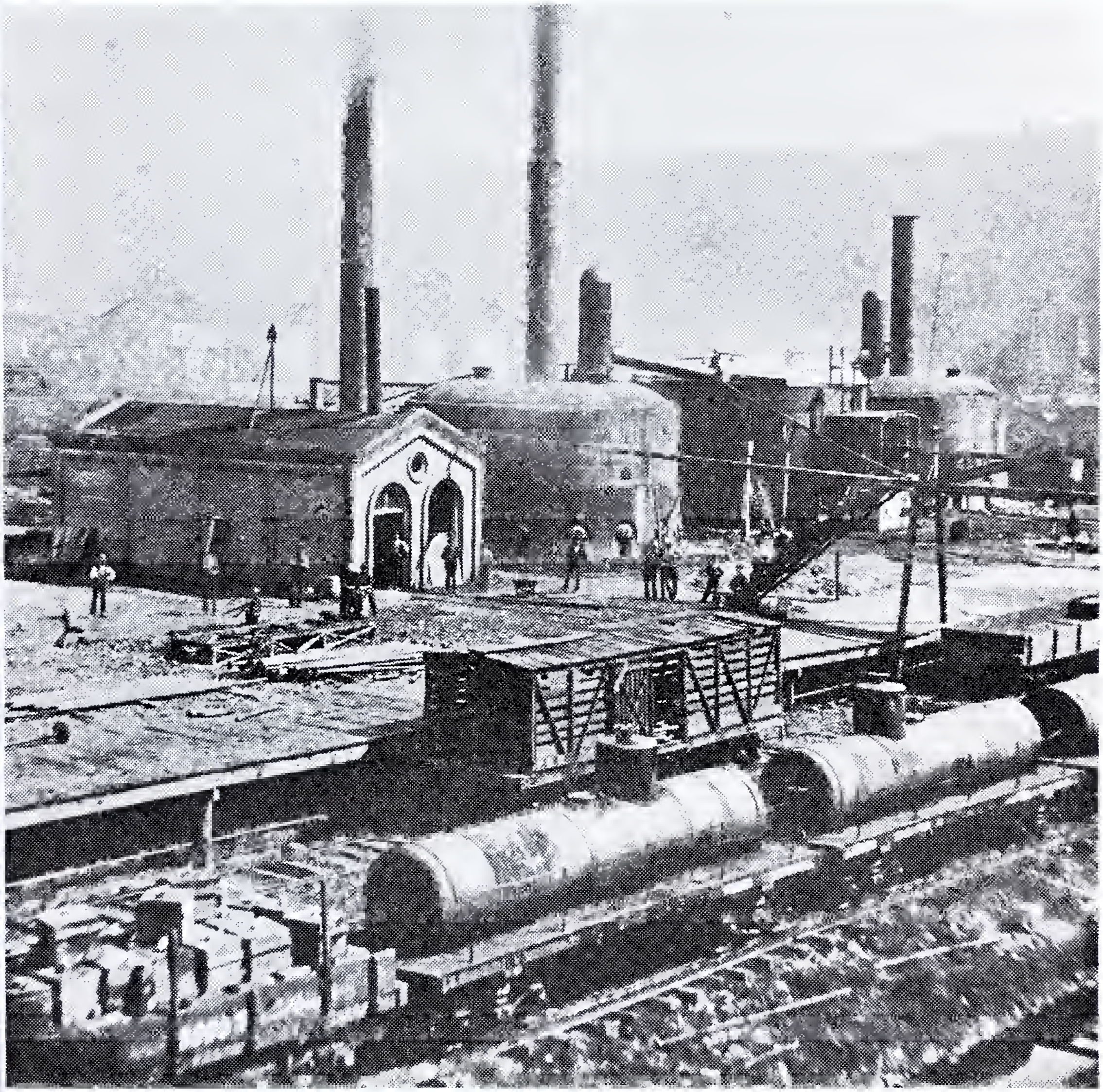
PITHOLE WELLS AND BALLTOWN, GENERAL VIEW, 1865.

The men shown have never been identified.



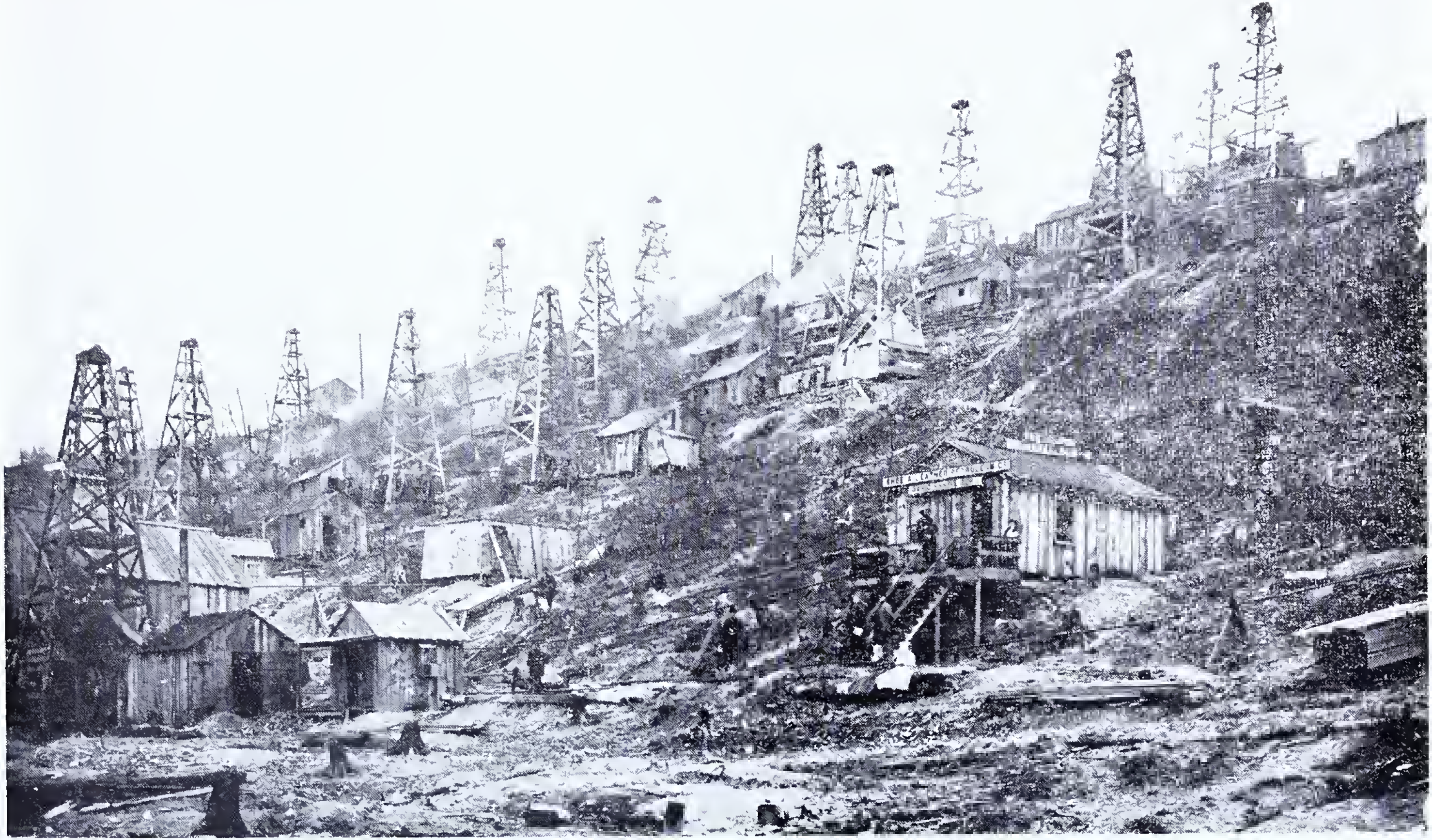
WELLS ON BENNINGHOFF RUN, 1865.

A most unusual picture; the house faintly visible at the far left is the Benninghoff home; the line over the hill towards the back of the picture is the first pipeline to transport oil over a hill; and the well at the far right is the first well in which casing was employed. Lightning struck these wells and they were all burned one hour after John Mather took this picture.



IMPERIAL REFINERY, NEAR OIL CITY, ABOUT 1873.

Note the first car, loaded with flasks of sulphuric acid. The first track is a dual-gauge track, wide for the Erie Railroad's rolling stock and narrower standard gauge for the other railroads.



PIONEER RUN WELLS, 1865.

The Shoe & Leather Petroleum Company was formed by Massachusetts men with a capital of $300,000 divided into sixty thousand shares of five dollars each. Note the wells on different levels, the iron-bound storage tanks, and the two ladies resting on a log and dressed in the latest fashion.

lumberman's trick was used. This "pond freshet" method consisted of using the dams of the many gristmills to back up the water and hold it until sufficient water was accumulated. Then, one after another, the flood gates were opened or the dams actually cut, thus releasing a vast amount of foaming, rushing water. The oil men paid either two, three, or four cents a barrel for their unique transportation in advance of each "freshet." The money went into a fund collected by an appointed person who in turn paid the gristmill owners for the use of their dams.

The Pennsylvania legislature set the "freshet" charge at three cents a barrel in March, 1863, a charge that amounted to a considerable sum, for never fewer than ten thousand and nearly always more than twenty-five thousand barrels were moved during every "pond freshet."

All the boats on the rushing water caused plenty of trouble; they swirled end-to-end, came down sideways, jammed into the banks, split open, and occasionally cracked against the bridge at Oil City. If all these possibilities for trouble were safely navigated, the flatboats tied up in the Oil City eddy, resting after their hard trip, and their contents were transferred to larger boats for the balance of the trip to Pittsburgh.

There was no railroad into the oil region towns until 1862 when the Oil Creek Railroad Company constructed a broad-gauge line from Corry to Titusville and then extended it six miles down Oil Creek in the next two years.

Exorbitant prices by teamsters were one factor causing this road to be established, and in 1862 it cost five dollars a barrel to team oil from some Oil Creek points to the nearest railroad terminals. Haulage from Oil Creek to Union Mills (now Union City, Pennsylvania) cost more than the rail freight on the same barrel of petroleum from Union Mills to New York City.

The business done by the Oil Creek Railroad was so great that extra trains operated most of the time, but the road still found that it could not handle all the traffic and finally notified dealers to hold up all shipments of oil because of car shortages and of the crowded single track. In the year 1864 alone, this road was able to pay a net profit of 53 per cent to its stockholders.

With the advent of the railroads into the oil country, length of haul for the teamsters decreased, and the amount of oil moved by water fell to a point where increased "freshet" charges per barrel would have been necessary for continuance. The Atlantic & Great Western Railroad decided that the petroleum business was permanent and by March, 1865, had lengthened its line from Corry to Meadville, then to Franklin and Oil City.

Later the same year Amos Densmore, an oil broker at Miller Farm, built the first tank car by constructing two 45-barrel tanks on a railroad flatcar. By the next year, the oil country was well covered by a net of rails, and shipping in tank cars of improved design was gaining favor daily.

A youngster of seventeen, Samuel D. Karns, was examining salt wells owned by his father near Burning Springs, West Virginia, in the summer of 1860. Young Karns cleaned out one of the wells and soon had it producing fifteen hundred gallons of crude oil daily. But unable to move the petroleum, he could only waste it and run it onto the ground. In November, Karns decided that to get the oil to market it would be necessary to build a pipeline to Parkersburg, a distance of thirty-five miles. Over the objections of his father and contrary to the advice of professional engineers who assured him that the oil would not flow by gravity through the line, young Karns prepared to build it; a survey was completed, materials ordered, and then came the Civil War which halted the project. Here was the first suggestion of the modern pipeline.

Pipelines were next suggested in November, 1861, by Heman Janes of Erie, an energetic oil pioneer. Janes advocated wooden lines and with a group of friends planned a line and was about to let a contract for its building when the group found itself unable to secure a pipeline charter from the Pennsylvania legislature. Organized opposition from the teamsters resulted in this setback.

After many trials and errors by individuals and by organized companies, the first successful commercial line was constructed by Samuel Van Syckel. Subjected to constant contempt and ridicule while his two-inch line was being laid, he took his meals in private and had to hire armed guards and station them along the pipe in order to prevent angry teamsters from ripping it up.

On October 9, 1865, Van Syckel tested his five-mile line which, to the astonishment of doubters, worked perfectly. In one hour eighty-one barrels of oil were pumped through, an amount which equaled the work of one teamster for three thousand hours. Movement of petroleum by pipelines cost one dollar per barrel. The innovation spelled the end of the colorful teamsters of earlier oildom.

The Torpedo

One of the most controversial figures in the early oil country was Colonel E. A. L. Roberts. A veteran of the Mexican and Civil Wars and an inventor of dental equipment as well as of a synthetic material for dentures, he began thinking of a torpedo for use in wells while he was watching shells explode in water during Army service in 1862. When he was discharged in the fall of 1864, he applied for a patent covering his "process of increasing the productiveness of oil wells by causing an explosion of gunpowder or its equivalent at or near the oil-bearing point, in connection with superincumbent fluid tamping."

Roberts arrived in Titusville January 2, 1865, and brought six torpedoes with him. On January 21 he exploded his first torpedo in the Ladies Well near Titusville; the well had ceased to produce and was known to be heavily clogged with paraffin. Exploding at a depth of 463 feet, the torpedo started the well producing successfully. Many others responded similarly, and the torpedo seldom failed to produce a larger oil yield. Great excitement was caused among the oil men by the success of the torpedo, and five other applications for patents were rapidly filed. The Roberts Torpedo Company contested all of them and finally won a perpetual injunction. In lawsuit after lawsuit, Roberts' patent was fully sustained, and he never lost a case. No other device has yet been discovered that has been as successful as the torpedo in aiding petroleum production. By 1867, Colonel Roberts switched his explosive to nitroglycerine and built a plant at Titusville where he made twenty-five tons of the dangerous commodity yearly. It is probable that no other United States patent has had more infringements against it than that issued to Roberts for his torpedo, and the inventor was indomitable in defending his rights fully. Roberts died a very wealthy man in 1881.

Characters

As in many a great discovery and in the development rush that often follows, strange characters came to the oil country while others were created there.

Doubtless the most unusual oil man of them all was John Wilkes Booth, who came to Franklin early in 1864 where, with two friends, he formed the Dramatic Oil Company. His partners were George Ellsler, who was manager of Cleveland's Academy of Music, and one Thomas Y. Mears. The trio drilled a well on three acres of land south of Franklin, bordering the Allegheny River. It resulted in the production of twenty-five barrels per day. Wanting to boost this yield, they "shot" the well with a torpedo and ruined it, with the result that it never gave another drop of crude oil.

Booth invested six thousand dollars in oil, including an interest in some virgin territory along Pithole Creek, but he made no profit from his speculations, and though he spent a considerable part of 1864 in and about Franklin, he closed out his holdings there September 27 and left the oil country for good. The next news about Booth came on April 14, 1865, the night he became the American Judas by assassinating Abraham Lincoln.

An innocuous but famous figure was that of John Washington Steele, better known as "Coal Oil Johnny." He inherited the rich McClintock oil farm from his aunt Sara when she tried to light her kitchen stove by using kerosene, only to be burned to death. Besides two hundred thousand in cash found in a household safe, Steele found that he had a daily income of about two thousand dollars.

First to get his talons on the young oil heir was Dan Fowler, an ingratiating oil-barrel salesman from Meadville. He conducted Steele to Meadville where he introduced him to the "right people," entertained him, fussed over him, and saw to it that in two days Steele purchased a team of horses, a farm, a house, invested in a building project, and lent a medical student money for furthering his education, thus expending $69,000. In less than a year, Fowler persuaded Steele that the investments were worthless and convinced the latter to sign the property over to him; in this manner Fowler was enriched for his easy work.

A more capable operator was Seth P. Slocum of Erie. This polished rogue became Steele's unofficial representative and guided him through sprees in Pittsburgh, Philadelphia, and a host of other cities. They resided at the best hotels, drank excessively, and spent lavishly. A Philadelphian gave Steele the title of "Coal Oil

Johnny." When Steele's bright red carriage, adorned with flowing oil derricks and tanks on the side panels, rounded a corner and splashed a group of people, one man is said to have exclaimed, "That must be that damned coal oil crowd!" It is also said that a newsboy confirmed the thought by yelling, "Yep, that's Coal Oil Johnny and his gang."

Slocum inveigled Johnny into giving him power of attorney, and soon Johnny's money disappeared faster than ever. Johnny worried little about funds, for he had made an arrangement with William H. Wickham, later the mayor of New York City, whereby Wickham rented his oil farm for six months for five thousand dollars a month, a rental which was to apply on the purchase price of $1,200,000. For six months Wickham sold leases and oil as fast as he could and retained the money; at the end of six months he refused to buy the farm and presented notes for the rental, signed by Coal Oil Johnny himself.

Finally Coal Oil Johnny ran out of funds, lost his oil property and many of his fair-weather friends. He returned to the oil country and his family, and after a few years moved West where he lived a successful life. Thirty-seven years after his spree, he wrote about his escapades:

> I spent my money foolishly, recklessly, wickedly, gave it away without excuse; threw dollars to street urchins to see them scramble; tipped waiters five and ten dollar bills; was intoxicated most of the time and kept the crowd surrounding me usually in the same condition.

Today, Coal Oil Johnny remains a symbol of early opulence and waste in the oil industry. But if he had not provided the bad example, someone else would have done it.

In addition to John Wilkes Booth and Coal Oil Johnny, those interested in the unusual will want to delve into the history of Gib Morgan who was the greatest story-teller of the early oil days; of Ben Hogan who rightly proclaimed himself as "The Wickedest Man in the World"; and of the Reverend Darius Steadman who brought education and religion to Pithole.

The Fantastic City

No story of Pennsylvania oil is complete without the history of fabulous Pithole City. Indeed, Pithole was the most distinctive oil boom town ever known. It was located eight miles north of Oil City where the small stream of Pithole Creek flows into the Allegheny River; around this location there had been a few poor farms, a little lumber, and nothing else.

Two former employees of the Humboldt Refinery at Plumer, named I. N. Frazier and James Faulkner, formed the United States Petroleum Company in the spring of 1864 and leased the sixty-five-acre farm of Thomas Holmden. Pithole Creek flowed through the center of these acres. They hired Thomas H. Brown to locate their well, and Brown succeeded with his divining tool. This well was finished January 7, 1865, and started to flow 250 barrels daily. The oil company stock had been $6.25 a share, but it now jumped to forty dollars a share or an increase of 640 per cent. Thus Pithole started on its successful way.

In April, the Homestead Well, owned by Boston capitalists and drilled on the farm adjoining the Holmden, came in for fifty barrels. On June 17 and 19, two other wells belonging to the United States Petroleum Company flowed in as real gushers, the first yielding 800 and the second 350 barrels a day. Naturally enough, these were named the Twin Wells, Number 1 and Number 2.

During the first five months of 1865, good producing wells were drilled in profusion in this sector, but in May there were only three buildings in Pithole, plus incalculable quantities of sticky mud. Gradually the mud dried, and quickly the news of the great strikes spread. And then the influx started. From every walk of life men poured into Pithole: real oil men, speculators, soldiers direct from the battlefields, teamsters, laborers, gamblers, merchants, "toughs," and mere spectators. Shady women came too, following sudden wealth and boom towns as they have always done.

In May there was no town; three months later Pithole boasted a population of fifteen thousand, a score of hotels, an unknown number of bars, bawdy houses, and beds. Beds were always a problem, and a bed in a haymow with perhaps twenty others sharing the room could often be had for one dollar. There finally were two banks, two telegraph offices, churches, a fire department, a newspaper, duly elected city officials, and a post office. The post office employed seven clerks and handled five thousand pieces of mail daily at the height of the excitement, and for a short time did more business than any other office in the state except Philadelphia and Pittsburgh.

Cash transactions were large. A poor farmer with one hundred acres, Jesse Rooker, refused at first to part with his land and held out until June when he finally succumbed to the tune of $280,000. A year before, it is doubtful whether his farm would have brought three hundred dollars, provided a buyer could have been found. In July, Messrs. Sherman, Pickett, and Philpot, all of Titusville, bought the Holmden farm outright for $1,300,000. In order to make the purchase look like a bargain, they finished the Grant Well on August 2, which had a daily output of twelve hundred barrels, and thereby caused the one-half acre next to it to sell for $16,500. Twenty days later, the Poor Well produced fifteen hundred barrels so that the Holmden farm increased in value to the point where the three owners resold it early in September for two million dollars.

Daily survival was no small task for much of the floating population at Pithole unless the inhabitants had stomachs of iron and a fine disregard for their future welfare. Food was very bad and very expensive, with four dollars being reasonable for three poor meals a day. Water vendors could often sell a barrel of good water for more than the price of a barrel of crude oil, and at times a ten-quart pail of water was worth one dollar. When water was scarce, liquor served as the substitute, but it was rough and tough on throats.

Entertainment was varied. The theater, very proud of chandeliers from Tiffany's, presented leading plays of the day; and the patrons must have enjoyed them when one considers the lavish gifts and money heaped on the actors. Social clubs provided fun for their members, with the Swordsmen's Club being the best known; the motto, R. C. T., was said to signify rum, cards, and tobacco, but when an interested clergyman inquired about the meaning, a prankster told him that the initials meant "Religious Counsels Treasured." So impressed was the minister that he eulogized the organization in a sermon. His message was not entirely incorrect, for the Swordsmen's Club gave liberally to all organized religious bodies at Pithole. The club provided fancy dress balls and concerts for members and guests. Its invitations were eagerly sought. Other entertainment possibilities at Pithole included a friendly game of poker, gambling at one of the many gaming houses, drinking and dancing at a music hall where the girls wore skirts much too short for the fashion of 1865, or visiting a brothel.

Robbery was so common that men generally carried pistols for protection. Even the United States Post Office was robbed. On the other hand, only one murder, that of William McEntee, was committed; and when the murderer was tried at Erie, he was acquitted on the grounds of self-defense.

But all was not as it seemed in this bustling oil center. If Pithole ascended to the dizzy heights with speed, it hit the down grade like a skier racing against time. Late in September two large wells ceased to flow and scared many producers and more speculators. New drilling halted at once, and gradually many of the smaller wells gave out. The speculators waited no longer but started for more fertile fields. Pithole withered like a leaf in autumn and practically blew away. In 1866 fire gutted the remnants of the town fourteen times, with the result that only a few people remained by the end of the year. Today the place is but a memory. Nonetheless, the Pithole field carved a place for itself on the eternal record book of petroleum. From fewer than one hundred acres of proved oil land, it gave the world more than 3,500,000 gallons of fine crude oil in much less than two years. The English oil historian, James Dodd Henry, wrote of Pithole and like towns: ". . . in no other part of the world do we find that places brought into existence by the discovery of oil have absolutely ceased to exist."

The Refineries

Small refineries were built in 1859 following Drake's discovery of oil, and Thomas Gale, a resident of the oil regions, reported that a plant in Titusville had been erected with a five-barrel daily capacity, and that the "shanty," the worm, and the still had cost two hundred dollars. For less than four thousand dollars, a refinery could be erected which would more than handle the output of the largest well in the field.

By the end of 1860, fifteen small refineries had been erected, all employing a very simple process. The crude went into an iron still, generally heated by coal; the oil then evaporated, with the vapor passing into a worm where it was condensed. The liquid was then run off into tanks.

Naphtha came first, next lamp oil, and then a heavy oil containing paraffin. Forty per cent of the crude oil refined was waste and was therefore often poured into Oil Creek or dumped upon the ground. Sulfuric acid was used in an agitator to remove impurities from the lamp oil, and it was finally washed with a hot caustic soda solution. After settling, in order to allow any gas to escape, it was ready to be put into barrels and marketed.

The first refinery of any considerable size was constructed by William H. Abbott and his partners at Titusville in the winter of 1860-61. It first ran crude oil January 22, 1861, when the crude was worth ten dollars a barrel at the wells.

The Downer Refinery, also called the Downer Oil Works, was the best-known refinery in the early oil country. The six-acre plant was built at Corry, a railroad junction point, late in 1861. Samuel D. Downer and his experts from the Downer Kerosene Oil Company in Boston operated the plant with A. C. Murdock as the manager and Joshua M. Merrill as the superintendent. All buildings were of brick, and every room was connected by a two-inch tube with the boilers; in case of fire, doors and windows could be closed and individual rooms filled with steam. Several serious fires were extinguished in this manner with loss held to a minimum.

The refining capacity of the plant was one hundred and fifty barrels of oil daily, and as the crude came into the yard on freight cars, barrels were rolled from the cars and emptied into a receiving tank. The first distillation was done in a still with a capacity of one hundred and fifty barrels, and 2 per cent of gasoline was distilled over to be used in the manufacture of gas; for example, the Morey Farm Hotel at Pithole was lighted with this type of product. The same operation also yielded 13 per cent of naphtha.

The balance of the oil went into a battery of twelve stills, each of thirty-barrels capacity, and the oil was run down to 59 gravity. Of this material 45 per cent was illuminating oil and when it was redistilled it was called Number 1 illuminating oil. Number 2 was a residuum oil and was worked into a lubricant with a gravity of from 32 to 35; when mixed with lard oil it was used on machinery. The final process was a treatment with sulphuric acid and then with caustic soda in order to destroy the blue coloring and the disagreeable odor. All the oil tanks were iron, and all acid tanks were of wood but heavily lined with lead.

Joshua Merrill was the first to use sulphuric acid and alkali as a deodorizing and bleaching agent in the final process following distillation. In 1869 he discovered by accident how to refine an oil of heavy viscosity, which he called a "deodorized heavy hydrocarbon oil." He did it by carefully controlling the temperature so that refining could take place without decomposing or "cracking." A good description of early refining methods can be found in J. T. Henry's *The Early and Later History of Petroleum,* published in Philadelphia in 1873.

A brother, R. S. Merrill, invented a dual burner in which two flames of light were actually separated by a thin jet of air, a burner which was deemed safe enough for use on steamships. Over the years the Merrills made many other improvements in refining methods. Nearly every refiner found new and better methods of processing crude oil year after year, many of them developing specialty products for special uses.

As 1863 commenced, sixty-one refineries were operating in the oil regions with capacities ranging from ten to four hundred barrels daily. A decade later the refining capacity in Pennsylvania was, in 43-gallon barrels, as follows:

In the oil regions	9,231	barrels daily.
In Pittsburgh	6,090	
In Philadelphia	2,061	
In Erie	1,168	
Total	18,550	

At the same time, refineries located outside the oil-producing regions had increased to the point where their combined capacity exceeded 28,000 barrels per day. The New York City area had a capacity of 9,790 barrels, Baltimore had 1,098 barrels, Boston 3,500 barrels; the Cleveland area topped them all with a still capacity of 12,732 barrels, most of which was owned by the Standard Oil Company of Ohio.

ROCKEFELLER AND OIL

In the spring of 1860, a young produce merchant traveled from Cleveland, Ohio, to Titusville to look into the oil business. When he returned home, John D. Rockefeller reported that he felt the oil business at this time was uncertain from the producing stand-point though the refining part of the business looked interesting if a continuing oil supply was assured.

Two years later, Rockefeller and his partner Clark invested in a small Cleveland refinery called Clark & Andrews, an action which marked the true beginning of the Standard Oil Company.

When the Pithole field was found in 1865 and most people were finally certain that new oil fields would be discovered regularly, John D. Rockefeller was convinced that the supply of crude oil was inexhaustible. He sold his produce business and bought his partner out of the oil business. By strict attention to details, always a Rockefeller trait, he was soon manufacturing oil barrels in his own cooperage shops, making acids, buying crude oil direct from the producers, and hauling much of the oil and his other freight with his own horses and wagons. Two years later sales offices were opened in New York City under the name of William Rockefeller & Company.

The Cleveland area refiners were handicapped by their location when they desired to compete for the Eastern markets and the export trade. Crude had to come from the wells to Cleveland, be processed there, and the finished kerosene reshipped to the seaboard. This extra freight represented a heavy additional cost per gallon.

In the spring of 1868, Rockefeller approached the Lake Shore Railroad (part of the New York Central system) and demanded a rebate on all oil shipped. As convincing factors, he mentioned water transportation and the possible movement of his refineries out of Cleveland into the oil regions. A rebate on crude oil and another on kerosene shipped to New York were promptly granted. It should in fairness be explained that Rockefeller had done nothing new and nothing dishonest but had only applied a common method, the rebate system, to a product and a field where it had never before been tried. Late in 1869, the Rockefeller refineries were the largest in the world and the omniscient young oil man cried, "The oil business is mine."

From almost the beginning of oil drilling in Pennsylvania—except for a few of the early years when domestic and foreign markets were being developed and then expanded—a large volume of Pennsylvania's oil constituted a major problem. Estimates vary in designating one-eighth to one-third of the yearly amount of crude oil as "excess production." When railroads and pipelines could not move all the crude oil, warehouses and storage tanks were quickly filled, and producers several times attempted to control production in the interests of stable markets. They met with little success.

Unable or unwilling to take a lesson from the troubles of the producers, by 1871 the refiners found themselves in a serious plight as the refining capacity was more than double the production of crude. The refiners often had to bid against each other for crude to keep their plants operating; yet the refined kerosene brought a disproportionately lower price on account of its abundance on the markets. When refineries were built in Europe, another loss of markets resulted. Naturally, few refineries operated at their full rate; many lost money and finally shut down.

Most concerned about the situation were the railroads and the largest refiners. A clandestine reorganization of an abandoned Pennsylvania corporation, the South Improvement Company, was effected January 18, 1872, when a secret contract and agreement was accepted by the chief officers of the New York Central, Erie, and Pennsylvania railroads, as well as by thirteen of the largest refiners from Cleveland, Pittsburgh, and New York. Of the thirteen refiner members of the association, ten were active in the oil trust. When the word had been secretly spread among the Cleveland refiners, twenty of the twenty-five independents of that city sold out to the Rockefeller group in less than six weeks.

The South Improvement Company agreement split oil freight on a percentage basis among the three main railroads. These roads agreed to double existing public rates on crude and refined oil from the oil regions to the refining centers, promised members of the company a maximum rebate of fifty per cent on all shipments, agreed to furnish waybills on all oil shipped over their lines to members of the company, and finally introduced the "drawback" whereby members of the South Improvement Company received rebates on oil shipped by their competitors.

The plot was revealed by accident on February 25 when an employee of the Jamestown & Franklin division of the Lake Shore Railroad raised the rates prematurely. The new rates indicated that independent refiners would have to pay eighty cents a barrel to ship from the regions to New York, a rebate of forty cents a barrel being returned to members of the South Improvement Company. The rate on refined oil per barrel from Pittsburgh to New York for those outside the orbit of the association was two dollars, and a rebate of fifty cents went to the South Improvement Company.

Those in the oil regions were faced with ruin and the loss of huge investments. Intense anger and excitement flooded the country. Local meetings were held at Erie, Tidioute, and Shamburg (between Titusville and Oil City) ; and on February 27, 1872, at Titusville's Parshall Opera House, three thousand furious oil men met to give battle to an octopus which was soon called by such names as "The Great Anaconda," "The Grand Conspiracy," and "The Forty Thieves."

The *Oil City Derrick* established a black-bordered box on its front page and listed on the "Black List" those who had instigated the crime against oildom. At Oil City on March 1, under the able leadership of Captain William Hasson, John Archbold, and Jacob J. Vandergrift, a Petroleum Producers' Union was established. Pledges were made that no wells would be drilled for sixty days and crude was to be sold only to those refiners not connected with the South Improvement Company. The names of Archbold and Vandergrift are reminders of Rockefeller's remarkable ability to recognize leadership when he saw it. Within a year or two, Archbold, Vandergrift, and Samuel C. T. Dodd were all working for Standard Oil. Archbold was president following Rockefeller; and Dodd, a Franklin attorney who spoke harshly against the South Improvement Company in the Pennsylvania legislature, was chief counsel and is said to have originated the Standard Oil Trust.

Just as important was the pressure on the Pennsylvania legislature by the oil region newspapers and by other papers which had taken up the cudgel against the nefarious scheme. A petition signed by over five thousand men was sent to Harrisburg demanding the passage of a free pipeline bill. Oil Creek crude purchasers who were attempting to buy oil for the combination were found out and then dismissed from the Oil City Oil Exchange.

When, on March 12, the Petroleum Refiners and Dealers Association of New York joined the Oil Creek area in the battle, and promised complete co-operation, victory was certain. The railroads became worried, especially after groups of Baltimore and Buffalo interests joined the fight on the side of the producers.

Late in March, Colonel Thomas Scott of the Pennsylvania Railroad met in New York with representatives of the Producers' Protective Association, which had been formed to enforce measures of the Petroleum Producers' Union. These men signed agreements whereby new rates were put into effect that were actually lower than the published rates before the South Improvement Company had come upon the scene.

Victory was complete when the Pennsylvania legislature revoked the charter of the company on April 2, 1872; the country, with the oil regions leading the way, rejoiced at the collapse of an attempted monopoly against petroleum.

John D. Rockefeller must have had a premonition that the South Improvement Company was doomed to fail. He had already dreamed up a scheme that would enable his company to secure greater control over petroleum, and it was introduced at a meeting of oil men held at Titusville, May 16, 1872. The new organization was to be named the Central Association of Refiners. Production was to be controlled by setting limits on the amount of crude that could be purchased from the producers; at the same time, quotas based on previous volume were to be established among the refiners. The able Henry M. Flagler outlined the plan, and, following him, two region refiners tried to elaborate on its possibilities. These men, John D. Archbold and Jacob J. Vandergrift, had been leaders in defeating the South Improvement Company; when they attempted to speak, they were met with hoots and jeers and were shouted down. Rockefeller and Flagler had apparently forgotten the enmity which was felt toward them in the oil fields, and they retired to Cleveland in defeat.

Men of the caliber of John D. Rockefeller are persistent. A month later the National Refiners' Association was formed through his efforts, and he was elected president. New York, Pittsburgh, and Philadelphia refiners aided in the initial organization, and when it was completed, oil region refiners were invited to join. The association proposed to divide the country into refining districts, with each district expected to refine a given amount of crude oil. For example:

Cleveland	to refine	25%	of all crude oil.
Pittsburgh	"	25%	"
Oil regions	"	18%	"
New York	"	16%	"
Philadelphia	"	16%	"

Any allocations for Erie, Boston, and Baltimore were simply forgotten.

By the end of 1872, an agreement was signed with the producers, and the control committee of the National Refiners' Association started buying crude and regulating the selling price of finished kerosene. The refiners, disagreeing with the quotas given them, made secret deals with the producers in order to get more crude oil. The refiners paid little or no attention to the committee. By June, 1873, Standard Oil had enough and withdrew from the association so that the latter collapsed at once.

At long last Rockefeller learned that co-operation with the oil refiners and producers was practically impossible, and he now set out to gain his ends by other but more positive means. He completed three deals that gave him the required strength. First, he secured from the Erie Railroad both barreling and shipping facilities in New Jersey, thus enabling him to control the export end of the market. Next, he persuaded the railroads handling the oil traffic to equalize the rates on crude oil and on kerosene. Finally, he hired Daniel O'Day to head his American Transfer Company and to build pipelines from the Clarion oil field to Emlenton where rail connection could be made with Franklin and Cleveland. In 1874 and in 1879, he bought the interests of the largest independent pipelines and by 1883 organized the National Transit Company. Taking over the refineries began in 1874, with coercion at times serving as the tool. Refiners who were not willing to sell were drastically undersold, found themselves without barrels, had delays in securing tank cars, and learned that part of the freight rates which they paid were rebated to others.

It did not take long for the Standard alliance to buy twenty of the twenty-one refineries in Pittsburgh, ten of the twelve in Philadelphia, and all of them in the actual oil regions. But in New York, trouble brewed when Colonel Joseph D. Potts of the Empire Transportation Company, which was owned by the Pennsylvania Railroad, became alarmed at the progress of Standard Oil and at the threatened loss of oil traffic for his line.

Backed by the Pennsylvania Railroad, Potts had purchased refineries in New York in 1877 and was operating them; Rockefeller protested and cancelled his freight contract with the company. The Erie and New York Central roads joined Rockefeller in his fight to oust the Pennsylvania Railroad as an actual oil competitor. Freight charges dropped to less than cost. The battle showed no signs of ending until the late summer of 1877 when the railroad strikes began and the Pennsylvania line lost millions.

Finally, the Pennsylvania Railroad decided to surrender, went to Rockefeller, and for three million dollars sold him the entire establishment of the Empire Transportation Company's refineries, pipelines, and tank cars.

In July, 1878, Rockefeller, at the age of thirty-eight, controlled 97 per cent of all refineries and pipelines in this country. Little wonder that John McLaurin, an early oil country newspaperman, wrote:

> If a man in Oildom drilled a dry hole, backed the wrong horse, lost at poker, dropped money speculating, stubbed his toe, ran an unprofitable refinery, missed a train or couldn't maintain champagne on a lager-beer income, it was the fashion for him to pose as the victim of a gang of conspirators and curse the Standard vigorously and vociferously.

Forward, March!

Assertive Pennsylvania oil men refused to stand idly by while Standard Oil controlled every phase of the oil business. Three oil men, Byron Benson, David K. McKelvy, and Major Robert E. Hopkins, formed the Tidewater Pipe Company, and, financed by many of the largest regional producers, constructed a pipeline from Coryville in the Bradford field to Williamsport; from there, the Reading Railroad took the oil to seaboard. The line was started in November, 1878, and by the next May it was in operation. The few New York and Philadelphia independent refineries who were still in business rejoiced at this relief from Standard Oil pressure and control. The cost of getting a barrel of oil to seaboard by pipe was seventeen cents against the previous cost of eighty-five cents. The day of railroad transportation of crude oil was rapidly ending.

The Tidewater independent pipeline was a threat to Rockefeller's grip on the oil business, and even his National Transit Company's lines could not dampen the ardor and progress of the independents served by the new line. The Standard went ahead and bought out all the refineries that had promised to take crude oil from the Tidewater Pipe Company with one exception. Even this blow did not kill Tidewater, for the company built plants of its own at Philadelphia and at Bayonne, New Jersey. Finding no other means of putting the new firm out of business, Rockefeller purchased one-third of Tidewater's stock and in October, 1883, Standard Oil and Tidewater halted their battles and became allies. By agreement, Standard was to handle 88½ per cent of the crude whereas Tidewater was to move 11½ per cent of it.

The old play was to be performed once again. By January of 1891, the recently organized independent refiners were shut off from their crude supply by the Standard. The Producers' Oil Company, Ltd., was formed, and a New York seaboard outlet was secured through an independent New York refiner.

Lewis Emery, Jr., of Bradford, an implacable and intelligent foe of Standard Oil, organized the United States Pipe Line Company about the same time. By July, 1893, he had a crude line extending eastward as well as a refined line from the region refineries. Doubters had thought that refined oil would be damaged during transport through the lines; to the contrary, the agitation in the lines tended to improve the fire test of the oil.

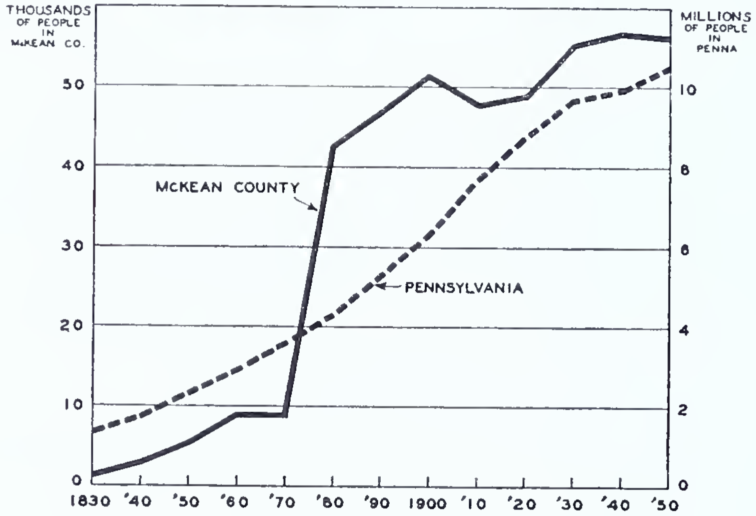
In a general protest meeting held at Butler, Pennsylvania, in January, 1895, by the producers and refiners who had suffered much from Standard Oil, the Pure Oil Company came into being, with David Kirk as the first president. Five years later, the Producer's Oil Company and Emery's United States Pipe Line Company joined with Pure Oil, with the result that in 1901, after a struggle of nine years, this pipeline reached Philadelphia and seaboard.

The entire battle—one that took the toll of many good men—was long and angry. The proof of how well the Pennsylvania oil men built is shown today by the fact that Tidewater and Pure are both important factors in the oil business.

New Fields

Ever since Drake's time, a century ago, the ceaseless search for more crude from new fields has gone on and there can be no more optimistic men than those who seek for oil. One of the best oil fields found in Pennsylvania was the Bradford field, discovered by Job Moses in 1871 when he had the courage to drill a well to the unprecedented depth of 1,110 feet, at that depth striking a rich oil-bearing sand that soon came to be known as "the Bradford third sand." While his producer gave but ten barrels a day, it uncorked another oil boom and larger wells were quickly found as the oil men swarmed into Bradford. The village, and McKean County, grew suddenly because of the Moses well, and the following chart shows how oil brought an influx of population.

HOW McKEAN COUNTY GREW



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Even today wells in the Bradford field are unique because, while they do not flow large quantities, they flow a long time; the daily output rises quickly in the first year to between seven and ten barrels a day and then starts a decline at an ever-diminishing rate but never apparently hitting zero. After the fifteenth year it may no longer be a profitable well to produce but secondary recovery methods can often change this trend too.

Another field worthy of mention, one of the most spectacular ever found, was the Cherry Grove strike in a wild part of Warren County, in 1882. On May 17, a "wildcat" well was struck and commenced flowing over two thousand barrels a day in territory long deemed dry and at once oil men paid fabulous prices for drillable acres close to the new well. Within a period of seven months more than 1,100 wells were drilled with sixteen of them yielding over a thousand barrels daily and several of these topped three thousand barrels a day; by September, 40,000 barrels of oil a day were being produced and piped from Cherry Grove, and Standard Oil was fighting against the independents for control of the field. And then disaster struck in the form of drastic fires of wells and tanks of oil, the price of crude declined, water seeped into the region from abandoned wells, and real estate values collapsed as frightened oil men and speculators hurriedly left for other territory to try their luck anew. By the end of 1882, Cherry Grove was on the way to reverting to wilderness. The villages of Garfield and Farnsworth had gained ephemeral fame and disappeared, and nature was at work doing a remarkable job of camouflage. But Cherry Grove had carved a niche for itself in the eternal record book of petroleum as the amazing output from the narrow cigar-shaped field of about 2,270 acres has never been equalled by any region producing Pennsylvania grade crude oil.

Many "wildcatters" have little faith in the geologists and their reports, and sometimes oil is found in places where no one but the driller would ever imagine it to be. Near territory that previously had been heavily drilled, a new narrow oil field was brought in on Music Mountain in the Bradford field in 1937. The Leidy field, discovered in Clinton County near Renovo in January, 1950, turned out to be the biggest gas strike ever made in the eastern United States. Experts claimed it would be exhausted within two years; they were not quite right, but at the end of three years it was practically gone.

In the northern Pennsylvania oil fields, water flooding was first used to rejuvenate an oil field and is now commonly employed though it costs about four thousand dollars an acre. This method was accidentally observed near Petroleum Center as early as 1877. As used today, flooding or "five-spotting" as it is commonly called, is done by drilling four wells surrounding the declining well; water is injected into the service wells for the purpose of pushing the oil, which is diffused through the sand, toward the bottom of the well. Pressures up to fifteen hundred pounds a square inch are exerted on the water, and generally the decadent well or oil field takes a new lease on life and increases production greatly. This method has been carefully and scientifically developed over the last thirty years.

In 1902, independent Pennsylvania refiners banded together to form the National Petroleum Association, a trade organization that marked the beginning of successful co-operation in the oil industry. It was formed not only to combat the inroads of the larger companies like Standard Oil, but also to unify the Pennsylvania refiners and prevent friction among them for they were often their own worst enemies. Excessive competition was spelling disaster for many of the independents and they arranged to turn the products they could not market over to a Surplus Committee of the Association who would attempt to dispose of them within forty-eight hours. Fixing of prices and disposition of surpluses lasted several years and then was abandoned forever by the Association as cumbersome and unworkable. But it did and still does accomplish much for the industry and all but four of the original founding refineries are still members of this trade association. Among the many advances it has worked for has been the allocation of crude oil purchases, standardization of tank cars, establishment of colors for lubricating oils, fighting against railroad discrimination, securing state oil inspection laws, and stabilizing mutual fire insurance. In 1928 the Association voted to accept Standard Oil Companies as members and the Standard Oil Company of Ohio was the first of these to join. Since 1928, the Association has hosted plant inspection tours, developed co-operative engineering work for refiners, improved refinery cost-accounting methods, and maintained an extensive program of industrial and government relations. This trade group, formed solely by Pennsylvania refiners, is very active today and holds semi-annual meetings where special problems are worked out by committees, prominent speakers are heard, and general aspects of the changing oil industry are freely discussed.

The structure of the Pennsylvania oil industry rests largely on what is done with its lubricating oil because a barrel of Pennsylvania crude yields about 23 per cent of lubricating oil compared to a national average of under 3 per cent. In 1923 Pennsylvania refiners were faced with low market prices and increasing competition from cheaper oils made from cheaper crudes from flush fields plus a mounting loss of markets from the immense advertising campaigns by the larger companies. Recognizing that the sale of lubricants was essential for continued prosperity, the Pennsylvania Grade Crude Oil Association was formed to sell the public on the inherent superior qualities of Pennsylvania oils. This trade association undertook a program of technical development in lubricants through the co-operation of such institutions as The Pennsylvania State University, Armour Research Foundation, Battelle Memorial Institute, and St. Bonaventure University. At the same time a group of field representatives was trained for the purpose of preventing misrepresentation and adulteration of Pennsylvania oils in the market places. In protecting the name and quality of Pennsylvania oils, this Association has never yet lost a case.

Through production research, the producers of crude were aided in more efficient recovery methods of underground reserves of oil including the best methods for water flooding and gas repressuring. As more than one-third of the oil beneath Pennsylvania is still there, untapped and waiting for someone to find the way to capture it, recovery methods will play a more important part in the years to come.

Most people are astounded to learn that Pennsylvania today has the second largest refining capacity of our states with only Texas being larger. The daily capacity of Pennsylvania refineries exceeds 425,000 barrels. With the daily average of Pennsylvania crude production running 36,000 barrels, though this figure varies depending upon the price crude is bringing, it is obvious that most of the refining capacity in the state is used in refining non-Pennsylvania crude oil which is shipped in by pipelines. There are also refineries located outside Pennsylvania that refine Pennsylvania oil and such plants are located at Falling Rock and St. Mary's, West Virginia.

Over the years national brands of oil have been built up by various Pennsylvania refiners with at least eight of them well known and distributed in many foreign countries. Bulk export shipments of finished Pennsylvania oils are still being made regularly because they are highly regarded abroad.

Although Pennsylvania wells produce an average of less than one-half barrel of crude oil daily, and the abandonment rate of wells is 6 per cent or the third highest in the nation, oil is still being sought after; currently the drill is probing for oil and gas beneath the waters of Lake Erie. Other production methods have also been tried with horizontal drilling attempted with success near Franklin during 1942. A shaft of 429 feet was made with a working chamber 55 feet high at the bottom and from this room two horizontal wells were drilled about 2,500 feet into the oil bearing sands. The wells were "shot" with six tons of high explosives on Thanksgiving Day, 1943, and proved to be equivalent to two hundred vertical holes. This scientific test of oil mining in shallow oil sands brightens future prospects. Mining for petroleum, first tried near Tidioute in 1864, continues to be attempted with the latest trial made at Pioneer, in Venango County, in 1944, but as yet this type of mining has been unsuccessful.

This is not the place to follow the technological advances in refining, suffice it to say that Pennsylvania refiners, working with a superior crude oil, have always been prompt to improve their methods. Better filtering and carefully controlled acid treatment were early improvements. The intermittent system of distillation was replaced in Pennsylvania by a continuous system or battery of horizontal stills connected at different levels to permit the oil to flow from one to the next lower one. Such batteries have now given way to the tube still by means of which raw material is pumped through tubes in a furnace.

When destructive distillation or "cracking" was first tried, Pennsylvania refiners were among the earliest users and as new processes of refining are discovered, the necessary equipment is installed in Pennsylvania refineries as quickly as in any others. Today the Pennsylvania industry has plants with highly complex processes such as solvent extraction, dewaxing, propane deasphalting, and with lubricating refining methods such as phenol, chlorex, MEK-benzol, and adsorption extraction.

THE CRYSTAL BALL

Looking into the future of Pennsylvania oil is fraught with danger for no one in reality can predict what will happen to the industry in the next decade of two. In more recent years, the northwestern Pennsylvania refiners have maintained their pioneering spirit and were first to use the centrifuge for dewaxing, the very first to introduce premium motor oil in refinery sealed cans to prevent contamination and guarantee quality, first to produce a gear lubricant which would meet the requirements for all types of gears and all climatic conditions, and the first to market a multiple viscosity oil (SAE 10W-20W-30). For comparatively small companies, these represent achievements of the highest caliber. Oil men believe that new techniques for production will be found that will enable them to recover more of the 134 million barrels of proved reserves of Pennsylvania crude still beneath the ground. Meanwhile present methods must be made to operate more cheaply unless the margin of profit can be increased. Refiners and sales managers see the need too for greater specialization and the production of many special products is a step in this direction. For the larger refiners, the petrochemical field holds interesting possibilities.

The Pennsylvania oil industry should survive for many years by overcoming difficulties in the future just as it has been able to do in the past. Wherever the black gold of crude oil flows, in every land and in every clime known to man, you will find Pennsylvania oil men today, doing a good job with methods learned in the oil fields of the Keystone State.

The Centennial Year

This revised pamphlet, appearing in 1959, marking the Centennial Year of Oil a century after Drake's amazing well commenced a new era for the world, provides only a brief history of Pennsylvania's oil industry. Standing as a symbol to Drake's achievement is the Drake Well Memorial Park a mile from Titusville, Pennsylvania; here is the world's finest oil museum with Drake's original drilling tools, a world-famous lamp collection, books, newspapers, and manuscript records of every kind telling of the early days of the petroleum industry in detail. An exact replica of the world's first commercial oil well stands proudly on the same site where Drake started drilling a hundred years ago. Scientists, researchers of wide variety, historians, teachers, and school children, visit the park yearly and are well rewarded with what they see. In the Woodlawn Cemetery at Titusville, where both Drake and his wife are buried, an impressive monument with a central bronze figure was erected in 1901 to honor Edwin L. Drake.

And today, petroleum, our gift from Divine Providence and the skill of man, stands as one of man's most useful servants.

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(Tells of a hunting trip along the Allegheny River in 1768; the party returned with a sample of oil from a spring.)

MONUMENTS TO PENNSYLVANIA'S PETROLEUM INDUSTRY

Erected	*Description*
1901	To Colonel E. L. Drake at his grave in Titusville, Pa. Erected by Henry H. Rogers, an oil pioneer and member of the original Standard Oil Company. Drake is named the "Founder of the Petroleum Industry. . . . At the threshold of his fame he retired to end his days in quieter pursuits."
1914	Large stone marking the site of the Drake Well near Titusville, Pa. "This native boulder marks the plot where through the foresight, energy, and persistence of Edwin L. Drake, the first well was drilled for oil. On August 27, 1859 oil was found at a depth of sixty-nine feet. This great discovery inaugurated the petroleum industry. Erected by Canadohta Chapter, Daughters of the American Revolution, August 27, 1914."
1941	Boulder marking first flowing well, on Route 62, two-hundred yards south of the Allegheny River Bridge at Tidioute, Pa. "The first flowing oil well in the world was drilled on this land by C. L. Hequembourg, August 13, 1860. Erected by the Tidioute Lions Club, 1941."
1953	Tablet at Crosby Hall, Dartmouth College, Hanover, N. H. Signalizes the first scientific examination of petroleum, by two Dartmouth professors; this in turn led to the formation of the world's first oil company through the energetic work of another Dartmouth graduate, George H. Bissell, class of 1845.
1955	Plaque mounted in the Sterling Chemistry Laboratory, Yale University, New Haven, Conn., honors the pioneering experiments on properties and uses of Pennsylvania crude oil by Professor Benjamin Silliman, Jr., during the winter of 1855. Presented by the American Petroleum Institute.

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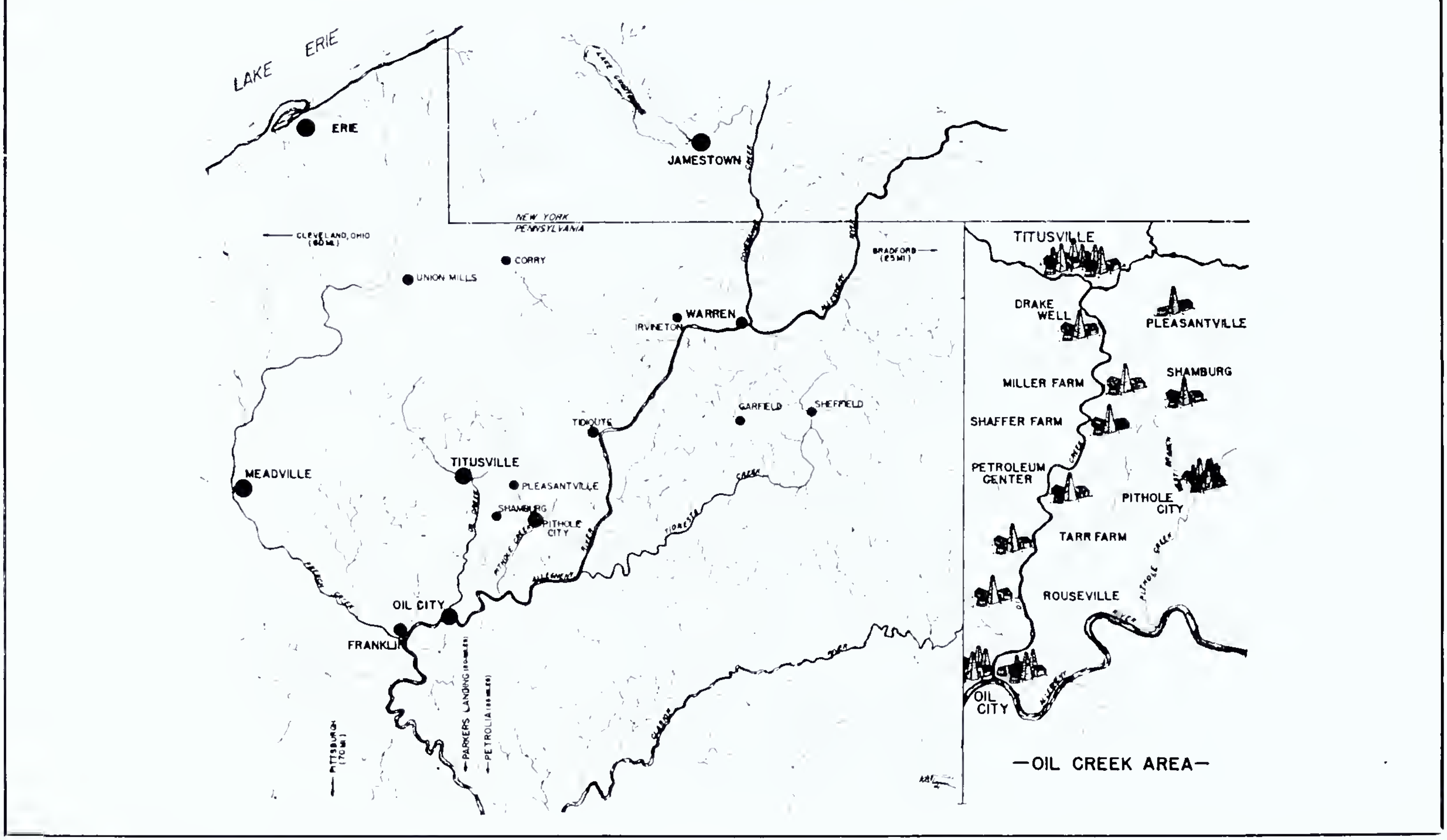
NEWSPAPERS

Daily oil region newspapers carried many important stories and statistics relating to the development of the oil industry. Good files of many such papers can be found at the Drake Well Museum, Titusville, Pa. The most important papers to consult are:

Title:	Issued at:
Crawford Democrat	Meadville, Pa.
Crawford Journal	Meadville, Pa.
Erie Weekly Gazette	Erie, Pa.
Forest Press	Tionesta, Pa.
Oil City Derrick	Oil City, Pa.
Oil City Register	Oil City, Pa.
Petroleum Center Daily Record	Petroleum Center, Pa.
Pithole Daily Record	Pithole City, Pa.
Pittsburgh Post	Pittsburgh, Pa.
Reno Times	Reno, Pa.
Titusville Morning Herald	Titusville, Pa.
Venango Spectator	Franklin, Pa.
Warren Mail	Warren, Pa.

MAP OF PENNSYLVANIA OIL REGION—1866



The general map on the left shows the most important oil region locations and indicates the distances to the nearest major cities. The smaller section to the right details the valley of Oil Creek between Titusville and Oil City. The seventeen miles between the two towns was the most important region in the early oil excitement.

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